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The Institute of Vitreous Enamellers
The Welsh Engineers' and Founders' Association
The Foundry Trades' Equipment and Supplies Association

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The Need for Exports

Steps have been taken by the Board of Trade to help industry to increase its exports. Goods are being made available by the limitation of home consumption, through increased taxation and the undoubted success of the various war savings schemes. In order to facilitate the working of the new export scheme, the Board of Trade has asked the various branches of industry to create groups, as this obviously limits the contacts to be made by the Government whilst at the same time it broadens the basis for participation. The new system in no way interferes with the obtaining by the normal well-established means of inquiries and orders, but once an order has been obtained, advice will be given as to the subsequent steps to be taken. Only the Government can know where best to cultivate exports, as associated with this question are considerations of policy, foreign credits, and shipping facilities. As exports occupy a place intermediate between the requirements of the fighting and other essential services and those of the home markets, it is obviously a wise step to join or create an export group. As we announced last week, the manufacturers of foundry equipment are forming such a group through the enterprise shown by Mr. G. E. France. Some sections of the ironfoundry industry have also formed groups, and any foundry still in doubt as to the steps to take should communicate with Mr. W. R. Blair, director of the Ironfounders' National Committee, Caxton House, East Block, Tothill Street, London, S.W.1. From what we hear, the procedure is not unduly complicated and by participation there is an extra assurance of the availability of raw material for the continuance of production, for obviously, licences are more readily granted for export orders than for domestic business. We are aware that few foundries do any direct export business, as most of it passes through the channels of the merchants, and complications apparently enter. This, however, does not constitute a valid reason for inaction, as the system now requires the full co-operation of the manufacturers. As the I.N.C. was created with the object of forming the essential link with the various Government departments it is unwise of any iron or malleable iron foundry, be it attached to an engineering establishment or independently operated, not to avail itself of the facilities so made available for simplifying wartime business. As we recently pointed out, the industry is much misunderstood and but little appreciated in the highest administrative circles and it will be only by the fullest co-operation of all foundries that its essential basic character will be appreciated, its wide activities recognised and its healthy continuation guaranteed. Any prejudices as to any detail in the general make-up of the Committee must be laid on one side, and full support accorded to its activities, especially those directed towards the increasing of exports of castings, as castings or built up into machinery. It is essential that the foundries making machine tools should be particularly active in I.N.C. circles, for on their efforts depends the extension of other industries capable of either increasing the quantities of armaments made or goods for export. It is desirable to extend the expression, "machine tools," to embrace machinery for the manufacture of textiles and other exportable commodities. The consummation of such an effort would react on the smaller foundries which *force majeure* have never even been remotely concerned with export. By the action of the smaller foundries joining the I.N.C., a knowledge would become available as to their potentialities for "feeding" the larger concerns. This is exactly what will give the best help to the State. As matters are at the moment, these foundries find that they can carry on quite well with home or, more truthfully, local trade. This type of business may logically fall into the third or lowest category of urgency and the more quickly it can be replaced by the second (export) if not first (munitions) category so much the better.

There may be no direct price inducement attached to export business, but the acquisition of foreign currency is so important that a successful export drive will have such profound repercussions on the financing of the war that every firm and individual will benefit thereby. Full participation in the work of the I.N.C. and the Export Groups will ensure that the ironfoundry industry at least will make a worthwhile contribution to the successful prosecution of the war. Moreover, it will strengthen an organisation which should be splendidly placed for guiding the industry through the difficult immediate post-war period, involving the readjustment of price levels, liquidation of war stocks and the reversion to peacetime activities.

Institute of British Foundrymen

ACTIVITIES OF BIRMINGHAM BRANCH

In spite of wartime difficulties, the Birmingham, Coventry and West Midlands Branch of the Institute of British Foundrymen was able to review a year of only slightly diminished activity when the members assembled for the annual meeting, held at the James Watt Memorial Institute, Birmingham, on May 2. Mr. A. Tipper, M.Sc., the retiring Branch-President, took the chair at the opening of the proceedings.

The Hon. Secretary (Mr. A. A. Timmins) presented the annual report, which stated that there had been no serious curtailment of normal activities, despite lighting restrictions and other difficulties. During last summer, the Branch entertained a number of international delegates as part of the post-Congress tour of the International Foundry Congress. Three works in the Midlands area were visited during their stay of two days, and they were also entertained at dinner. Over £200 was subscribed by members of the Birmingham Branch to the Conference fund opened for this occasion and on behalf of the Branch Council thanks were tendered to members for their generous support. The directors of the three firms were also thanked for allowing the visitors to tour their works. There was some delay in commencing activities in the winter session owing to the outbreak of war and the uncertainty of the position. It was decided, however, to carry on as far as possible, the session opening with an afternoon meeting and open discussion on "Foundry Problems in Wartime." This met with an encouraging response from members, 35 of whom attended. Four further meetings, including the present, had been held, the average attendance being 40. This was rather lower than in previous years, but was still encouraging, taking into account travelling difficulties. It had not been possible to arrange any works visits, firms naturally working at full pressure. Nor was it considered advisable to arrange an annual dinner and dance, but a buffet dance was held.

Record Subscription Income

Financially, the year was successful, the subscription income of £477 19s. being a new record for the Branch. The balance of £39 17s. 3d. was slightly higher than that of the preceding year. Membership had suffered a very slight decrease. Members now numbered 340, against 344 last year. During the year 25 members were lost, 8 being transferred to other Branches, 5 resigning, 3 having died and 9 being removed from the register for arrears of subscriptions. Twenty-one new members were elected.

It was mentioned that the Institute was keeping a register of all members serving with H.M. Forces. Six members of the Branch were on service. In the case of members so serving the General Council has decided to waive the subscription until the end of the war, without loss of privileges.

The Branch had been honoured by the election of Mr. D. H. Wood as Junior Vice-President of the Institute, and congratulations were offered to Mr. Wood on his appointment. Another member of the Branch, Mr. J. G. Pearce, was awarded the Oliver Stubbs medal, while Mr. G. R. Shotton and Mr. J. J. Sheehan were granted diplomas for their excellent Conference Papers.

The report concluded with the intimation that it is the firm intention of the Branch to carry on with its normal activities as far as is conveniently possible, and with an appeal for the support of all members. "Now, as never before," it was added, "is the Institute a necessity, for it is through its facilities that foundrymen can widen their knowledge and discuss their everyday problems to the benefit of all concerned. The Institute, through its Technical Committee and with the British Cast Iron Research Association, is ready to offer its help and advice to all sections of the foundry trade in the new problems which they are meeting under present conditions."

Proposing the adoption of the report and accounts, the CHAIRMAN congratulated the Branch on what he described as an excellent session considering the difficult conditions. A great deal of the credit, he said, was due to the Hon. Secretary, Mr. Timmins, who had done so much to keep the Branch together.

MR. G. R. SHOTTON seconded the motion, which was carried.

The CHAIRMAN, having presented the diplomas awarded to Mr. J. J. Sheehan and Mr. G. R. Shotton, submitted the name of Mr. N. C. Blythe for the Branch-Presidency. Mr. Blythe, he said, had served as Senior Vice-President. He possessed all the qualifications for the premier office.

MR. L. W. BOLTON seconded the proposition, and it was heartily endorsed by the meeting.

MR. BLYTHE took the chair and, in returning thanks for his election, expressed a hope that he would still be President when they met to celebrate a victorious peace.

Other elections were:—Senior Vice-President, Mr. T. H. Gameson; Junior Vice-President, Mr. J. J. Sheehan; members of Branch Council, Mr. J. W. Gardom, Mr. W. L. Johnston, and Mr. A. E. Lister; Branch delegates to General Council, Mr. L. W. Bolton, Mr. G. T. Lunt and Mr. T. H. Gameson; Branch delegates to Technical Committee, Mr. L. W. Bolton and Mr. G. R. Shotton; Hon. Auditors, Mr. W. L. Johnston and Mr. G. M. Callaghan; Hon. Secretary, Mr. A. A. Timmins.

The retiring President, Hon. Secretary and other officers were cordially thanked for their services.

Films were afterwards shown illustrating the centrifugal casting process and the puddling of rod iron.

Catalogues Received

Rolls. A folder received from the Davy & United Roll Foundry, Limited, Empire Works, Haverton Hill, Billingham, County Durham, carries a number of interesting illustrations of chilled, grain and steel rolls, one of which, a chilled plate roll, weighs 26 tons. Additionally a range of general steel castings is shown.

Cast-Iron Rod. Leaflet 319 issued by the Sheepbridge Stokes Centrifugal Castings Company, Limited, of Chesterfield, is of particular interest to foundrymen, as it describes two brands of cast-iron rod—one a plain and the other a nickel chromium alloy iron. Mark III, the second grade, is of the type which can be hardened and tempered and instructions for effecting this are included. A wide range of sizes—from ¼ in. to a foot diameter—is being manufactured; they are supplied in the rough-machined condition so as to eliminate the despatch of faulty material.

Fans. Catalogue No. S.F.310, just issued by Davidson & Company, Limited, of Sirocco Engineering Works, Belfast, Northern Ireland, is devoted to axial flow compressed-air-driven fans specially designed to meet the exacting requirements called for in connection with the auxiliary ventilation of mines. Apparently, as in foundries, compressed air as a source of power is fairly general in mines and so it is handy to use it for auxiliary ventilation.

R. B. PULLIN & COMPANY, LIMITED, of Brentford, have acquired the issued share capital of Measuring Instruments (Pullin), Limited, of West Ealing, manufacturers of voltmeters and other electrical apparatus.

Random Shots

It is a pleasing "fortune of war" which brings the Annual Conference to Cheltenham this year. It might, of course, be exaggerating just a trifle to predict that those members who generally meet only at this yearly function will see each other clearly for the first time, for as a rule foundrymen hold their festivities behind a thin veil of smoky grime, that familiar adjunct to most big industrial towns.

* * *

A limited social programme has been arranged and Saturday afternoon has that magical (but often purely misleading) word printed at its side, FREE. To be free in Cheltenham means an opportunity for a diversity of pleasures. The obese (does anyone get fat on foundrywork?) and the dyspeptic (ah! that's nearer the mark) can go hand in hand to the pump-rooms, whose waters are said to resemble those of Karlsbad and Marienbad and contain more $MgSO_4$ than any other spa in the country.

* * *

The stroller, taking thought for the evening's activities, will probably go no farther than the promenade where he can, whilst sweltering in the heat of a June afternoon, ponder over the statue of Dr. Wilson, who perished in the icy wilderness of the Antarctic with Captain Scott.

* * *

And what is to prevent the young and vigorous from climbing Cleeve Hill in order to be able to say that he has been doing a spot of mountaineering? Whereas the truly morbid might cycle to Sudeley just to see the burial spot of the only woman who managed to outwit King Henry VIII by the simple trick of outliving him.

* * *

According to young Johnny who has worked it out with the aid of a stamp catalogue index, the letters included in "United States of America" can be reassembled to yield the names of no fewer than forty other countries, including real big fellows like France, Russia, India and Canada. Startling as this is, it would be more startling still if it were any indication of the possible future redistribution of the Balance of Power!

* * *

In the drive for scrap iron is a new menace likely to arise? It might easily be that the body snatcher of the early days of the last century will be replaced by the more modern nocturnal coffin-handle snatcher.

"MARKSMAN."

Production of Some Engineering Castings

In a letter which we have received from Mr. A. Marshall, the author of this Paper expresses his appreciation of its presentation in our columns, and points out that a printer's error occurs in a cross-column heading, on page 311, where "Press Head" has been printed instead of "Press Bed." In the Glasgow discussion the reply to Mr. Erskine's question makes reference to Fig. 14 instead of Fig. 20, and the answer should read marine cylinder cover and not Diesel cover.

Sinterloy Steel

A new powder, designated as Sinterloy, which may be pressed into any desired form by the accepted methods used in powder metallurgy, is being distributed by Charles Hardy, Inc., 415, Lexington Avenue, New York. The powder is available in three compositions for the production of steel with a carbon content of approximately 0.15, 0.4 and 0.8 per cent. It is said that the material in most cases may be pressed directly into the shape of the finished product so that machining cost and metal losses are entirely eliminated. It is frequently used in particular applications where difficult machine work is required and exact duplications of parts desired.—"Steel."

Sand Control in the United Kingdom Foundry Industry

By J. J. SHEEHAN, B.Sc., A.R.C.Sc.I.

Official Exchange Paper presented on behalf of the Institute of British Foundrymen to the annual convention of the American Foundrymen's Association in Chicago

It is intended that this Paper shall be of a general nature, and as a consequence of general interest to members of the American Foundrymen's Association. Particular aspects of the subject are already familiar to its members through the Proceedings of the Institute of British Foundrymen, the Bulletins of the British Cast Iron Research Association and other publications of the British technical Press, and are very fully indexed in the Association's "Testing and Grading Foundry Sands and Clays."

The increase in interest in sand control throughout the foundry industry of Great Britain has been most marked in recent years. For years this interest was definitely academic, and extended only slowly from the atmosphere of Government Reports and University dissertations to the moulding floors of the country.

There are many contrasts between the sand practices of the United States and the United Kingdom, and not the least is the origin of the technical control now established in both countries. In the U.S.A. in 1921, a meeting of the board of directors of the A.F.A. authorised the use of funds for a "research on natural and synthetic moulding sands." In Britain in 1918 Prof. Boswell, D.Sc., published at the instruction of the Ministry of Munitions of War "A Memoir on British Resources of Refractory Sands for Furnace and Foundry Purposes."

In both countries prior to these dates some individual workers published the results of their investigations—for example, Dr. Moldenke in America and Mr. John Shaw in England. But it was definitely the board meeting of the A.F.A., and the instructions of a Government Department, that started organised research on foundry sands in the respective countries.

Without detracting in any way from the scientific and technical value of the work of the Universities and Government Departments, the author is strongly of the opinion that the American foundry industry has had an undoubted advantage in having initiated, financed and provided the personnel for this organised research.

Origin of British Work

Americans are familiar with the history of their own effort, and that of the United Kingdom is briefly as follows:—

In addition to John Shaw, others, notably A. B. Searle and A. L. Curtis, contributed valuable individual effort to the study of sands. In 1918 Prof. Boswell's "Memoir on Refractory Sands" was published, and was followed by Prof. W. G. Fearnside's Papers, and the work of G. W. Holmes, O. Smalley and J. E. Fletcher.

An important development was the formation, in 1920, of the British Cast Iron Research Association, and the appointment, in 1924, of Dr. J. G. Skerl to work under the general supervision of W. J. Rees, of Sheffield University, and carry on organised research on the subject of foundry refractories and moulding sands.

In 1930 the Institute of British Foundrymen formed a Sub-Committee on Sands, which, apart from its specified work in formulating Standardised Routine Tests for Sands, has been of inestimable value in interpreting the work of the British Cast Iron Research Association, and correlating the work of the A.F.A. with United Kingdom foundry conditions.

Most of the members of this sub-committee have presented, to the general meetings and the Branch meetings of the Institute, Papers as valuable to the personnel of the industry for the local discussions they created as for the technical matter they contained.

A further considerable important addition to the study of sands has been the recent formation of the Moulding Materials Sub-Committee of the Iron and Steel Institute. The title of this sub-committee, "Moulding Materials Sub-Committee" (not Sands Sub-Committee or Steel Sands Sub-Committee) is indicative of the nature of the work to be undertaken, and this work must cover not only the investigation of steel moulding sands, but that mysterious material "compo," and the numerous paints and washes with which the steel industry of Britain is blessed or cursed.

At the outset this sub-committee, as well, indeed, as the Sands Sub-Committee of the I.B.F., has been delayed by unending discussions as to the relative merits of the test methods recommended by the A.F.A. and B.C.I.R.A., and individual modifications of both these recommended methods, and in an effort to avoid the consequent delays, a Joint Committee on Sands has now been formed with the sole object of co-relating test methods. The Joint Committee consists of representatives from the B.C.I.R.A., the Iron and Steel Institute, the British Non-Ferrous Metals Research Association and the Institute of British Foundrymen. This step should allow the sub-committee mentioned to devote attention to more immediate and profitable problems of the industry—such, for example, as the items mentioned in the programme of the Iron and Steel Institute:—

"(3) The relation of 'bond' in naturally bonded and synthetically-bonded sands to 'stripping,' 'burning-on,' etc., including the properties of reclaimed sand."

"(6) The effects of pressure on the sintering and softening of moulding sands and 'compos.'"

"(9) The volume changes in moulding sands and 'compos' from 0 to 1,400 deg. C., including the effects of composition, grading, ramming density, etc."

Work in Progress

Organised work on sands is now carried out in Britain by the following institutions, and their principal interest indicated as follows:—

The Moulding Materials Sub-Committee of the Iron and Steel Institute.—Steel (Moulding Materials).

The Sands and Refractories Committee of the British Cast Iron Research Association.—Cast Iron (Moulding Materials).

The British Non-Ferrous Metals Research Association.—Non-Ferrous Metals (Moulding Materials).

The Sands Sub-Committee of the Institute of British Foundrymen.—General; Iron, Steel and Non-Ferrous (Moulding Materials).

Joint Committee.—Testing Methods and Standards.

It is interesting to compare organised sand testing and control in America, where a start was made with a Joint Committee on Moulding Sand Research, followed by specialised sub-committees strictly under the direction of the A.F.A. In the United Kingdom, the matter started with a series of sub-committees under various controls, and is likely to continue so.

Steps have been taken to eliminate one very definite handicap of British individuality by the formation of the Joint Committee, and now it is expected that steady progress will be made, with the additional hope that there is a special advantage in specialisation.

How Application is Practised

The foregoing is a review of the academic aspect of the sand testing and control. The actual application of sand control to the industry is receiving increased attention, mainly through the Institute of British Foundrymen operating by means of its Technical Committee and Branch meetings, and so influencing the present generation of foundrymen, and the British Cast Iron Research Association acting as consultants to its member firms, and through its educational programme, influencing the coming generation of foundrymen.

The composition and constitution of the Institute lends itself admirably to this increasing application of sand control. The Institute is composed of twelve Branches and five sections. These Branches are formed on a convenient geographical distribution and cover the country. The Branches elect annually two members to the Technical Council. The Technical Council receives regularly the reports of the Sands and other Sub-Committees, and is in contact with those who are initiating and interpreting the very latest technical developments. These developments are reported back to the Branch meetings either conversationally, by personal contact, or officially through reports and Branch Papers. In this way a widespread interest is developing.

The industry will undoubtedly benefit more from this distributed technical ability among its operatives than it would from a narrow circle of scientific knowledge, however excellent that knowledge may be.

The application of this new knowledge is resulting in better practice in the foundries of Great Britain. Synthetic moulding sands are being more extensively used. It is being realised also that by studying the quartz grain and the composition of the clay bond of the natural moulding sands, every characteristic of the best moulding sands can be reproduced, and even undesirable characteristics avoided, so that a synthetic moulding sand, instead of being a substitute for, is now considered an improvement upon, the natural deposits.

Natural Moulding Sands

The quality of the natural moulding sands is being maintained by new additions of prepared clay. In green-sand practice the ratio of dry to green strength is being balanced by like additions. In dry-sand practice, horse manure, sawdust, chopped straw and cowhair are all being dispensed with and adequate temporary dry strength is being obtained by suitable additions of cereal binders, and expansion effects minimised by controlled additions of graded coal dust or silica fines.

Green-sand practice is extending in the steel foundries, and for medium-weight castings dry-sand practice is gaining ground from "compo" mixtures. The "compos," which were mysterious mixtures of old firebricks, old graphite crucibles, coarse silica sand, old fireclay pots all crushed to less than ¼-in. size, bonded with ganister and fireclay, are now being substituted by a combination of a refractory plastic material and a non-plastic material termed "grog," usually any suitable fired refractory product. Quoting from the Third Report of the Steel Castings Research Committee of the Iron and Steel Institute, "A series of tests on 'compo' mixtures of all grades has shown that the assumed virtues of old crucibles from crucible steel melting are illusory. Without ex-

ception the tests show that 'compos' in which the crushed crucible pots are replaced by good, clean, burned fireclay (*i.e.*, grog or chamotte), are at least as good in all properties as the old mixtures."

Economies from Synthetic Sands

Parallel with this improvement in practice there has developed an improved knowledge of the resources of moulding materials within the country. It is a tribute to the work initiated by Boswell at the end of the 1914-18 war that the objective sought then has been obtained in full before the present war. Foundrymen are now in the fortunate position of being completely independent of overseas sources of moulding materials, and to some extent of even internal transport, through a better understanding of local deposits and a fuller use of reclaimed materials.

For example, a steel foundry in the Midlands previously operated on overseas steel moulding sand of good quality and now uses a controlled synthetic sand with the following results:—

With the Old Method

Transport from overseas and from home ports to central England was expensive.

Storage under cover had to be provided to prevent bond being unevenly distributed by heavy winter rains. This storage had to be extensive to accommodate shiploads.

Processing.—Every batch of moulding sand was milled for 12 minutes to distribute bond and to break up hard dry clay pellets which formed in transport and storage.

Cores were made from the used moulding sand and absorbed an excessive amount of core binder. Such cores were unsatisfactory for very obvious reasons.

With the New Method

The whole process is reversed.

Cores are made with silica sands from local deposits selected among other reasons to give high strength with a minimum of core binders.

Processing.—No new sand, as such, is added to the used moulding sand in the mill (sand losses are made good by the disintegration of the burnt used cores); powdered clay and a cereal binder renew the bond. The mixing time has been reduced to 5 mins.

Storage.—The silica sands are stored in the open, and adequate storage only for wagon-loads, not shiploads, is required. (The sand quarries in Britain are worked all the year, winter and summer.)

Transport is at a minimum from local quarries. (Many foundries in the Midlands obtain their sands as a return load for road transport lorries.)

Sand control has thus proved to be of national importance in releasing ship space and minimising internal transport, and of commercial importance in providing a less expensive raw material and producing better castings.

That last paragraph must sound to Americans like a sermon to the converted. The British are aware of the more extended use of synthetic sand in American industry. Very frequently in British technical literature that fact is explained by the remark—"The American foundry industry was handicapped by a shortage of suitable naturally bonded sands and as a consequence had to develop a substitute." That explanation is not correct; it is not the reason for the rapid development of synthetic sand technique or United Kingdom tardy recognition of its advantages. The mechanisation of American foundries provides the reason and the explanation.

Good natural moulding sands, more particularly for high-temperature work, are neither abundant nor widely distributed anywhere. The peculiarity of their grading is not an easy task for nature, and to quote Boswell (p. 30, "A Comparison of British and American Foundry Practice"), "The current which is able to transport fine mud as a cloud of suspended matter may be unable to move sand, and the stream which rushes down from the hill-country, laden with sand and milky with suspended clay, is not likely to drop all its burden at once. Rather does it first drop the sand as its velocity is checked on its entering quieter water and carries on the mud to a more distant resting place."

By bringing together in the most desirable proportions what nature has distributed, as in synthetic sand practice, the ideal sand is more nearly achieved; and such a sand is a necessity in mechanised foundry practice.

A good moulder can make a good mould from very indifferent materials. The machine is particular, it cannot readily react to wide variations in the condition of the materials it has to process. The mechanisation in American foundries is receiving the sand practice necessary to it and the increasing mechanisation in United Kingdom foundries is demanding it.

The numerous surveys of United Kingdom natural resources indicate that it is possible to obtain and apply widely this developing technique to the foundry industry. Silica sands of high quality are abundant and in a variety of gradings.

In the flooded river valleys of the south of both England and Ireland extensive deposits of transported clays exist similar to the clays of Florida, Tennessee, Kentucky and Alabama. Many are similar in geological age (Tertiary), and in relative location, *i.e.*, at the southern limit of a glacial period. These clays are plastic and refractory. The "white burning" varieties are extensively used in the pottery industries; other varieties are gradually finding employment in foundries.

Summarising the condition of sand control in the United Kingdom foundry industry, it is possible to state with certainty that there are adequate academic facilities, ample raw materials of high quality, and the technical ability to use both the knowledge and the materials, but there is need for a wider distribution of this technical ability. It is now a most pressing problem, and dependent entirely on individual efforts.

Of lesser urgency, but yet of great importance, is the necessity of continually adding to the available knowledge. In this necessity it is possible to receive much encouragement from the problems faced and overcome by others. In that respect ready acknowledgement is made of the assistance already received from the work of the American Foundryman's Association, and the hope is confidently expressed of future interesting work.

A New Type of Oil-Sand Mixer

Simplicity is the keynote of the design of a new range of sand mixers which have just been placed upon the market by the Fordath Engineering Company, Limited, of Hamblet Works, West Bromwich. The makers have initially decided upon four sizes, based upon the batch load. The largest takes a ton, and the smallest 20 lbs. Intermediately there are the 10-cwt. and 1½-cwt. sizes. The most interesting feature about the machines is that the speed of mixing is two to three minutes, independent of the size of the unit. From the mechanical aspect, several novel features have been incorporated. The blades, of which there are three, have been the subject of special treatment and, as will be seen from Fig. 2, one of the blades carries two projections, which, during revolution, pass through corresponding grooves in the inclined ribs attached to the pan sides. This system makes a noteworthy contribution in the direction of the complete evacuation of the mixed sand from the pan by forced discharge. The discharge time for the 10-cwt. size is of the order of 30 secs. Fig. 1—of a V-belt-driven model—shows how the discharge takes place through a side chute which is operated by a hand wheel controlling a rack and pinion system.

With the mixing of an abrasive material like sand, there is obviously wear, and the designers have taken cogniscance of this by making all the wearing parts so easily replaceable that the attentions of the skilled mechanic are unnecessary.

The essentially "foundry" parts having been standardised for each size, an intelligent appreciation has been shown of the divergence of driving conditions which prevail within the industry. Thus the mixers are made available as a complete unit mounted on a bedplate and motor driven through V-ropes; a belt-driven unit utilising totally-enclosed bevel gears with fast and loose pulleys, and finally a complete unit mounted on a bedplate with worm transmission and V ropes.

These machines, which are to be known as the "New Type" foundry mixers, are now available for inspection by our readers at West Bromwich, and for those unable to make the trip an illustrated folder has been prepared.

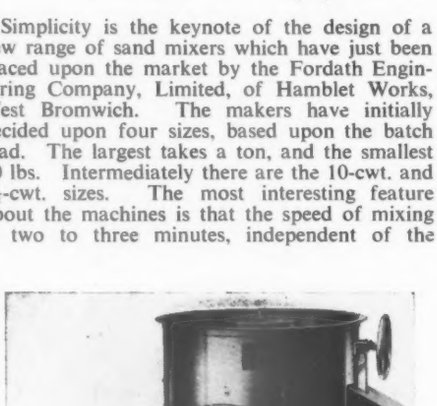


FIG. 1.—NEW TYPE FORDATH MIXER.

FIG. 2.—SHOWING THE ARRANGEMENT OF THE MIXING BLADES.

The Iron and Steel Institute

ANNUAL MEETING IN LONDON

The annual meeting of the Iron and Steel Institute was held in London on Thursday and Friday of last week, at the offices of the Institute, Mr. James Henderson presiding at the outset in the unavoidable absence, through illness, of the Right Hon. the Earl of Dudley, M.C. (Retiring President).

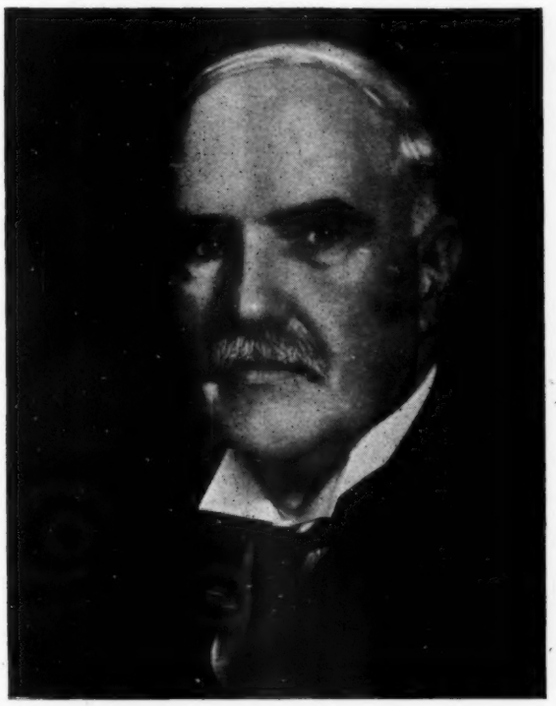
REPORT OF COUNCIL

The Report of Council points out that the membership of the Institute at December 31, 1939, was 2,704, an increase of 74 during the year. The membership was greater than on any previous occasion, and the increase in the membership, both of full members and of associates, is satisfactory. The Council consider that there is no reason why this level should not be maintained, although a considerable falling off in the non-British membership must be anticipated as a result of the war. The Council believe, however, that there are still many officials in the iron and steel and associated industries, as well as individuals interested in ferrous metallurgy, to whom membership would be advantageous.

The Council regret to record the deaths of some 44 members which occurred during the year 1939. Special reference is made to the following: Prof. Henry Louis, Monsieur Dreux and Mr. Schwab had all had very long associations with the Institute, having taken up membership in 1881, 1889 and 1895, respectively. Prof. Louis, who, like Mr. Schwab, was a Bessemer Gold Medallist, was President for the term 1929-31, while Monsieur Dreux and Mr. Schwab—two of the best-known members of the steel industries of France and the United States of America—were Honorary Vice-Presidents. Prof. Albert Sauveur, another Bessemer Gold Medallist, and Prof. Boylston were American scientists of world-wide fame, who had contributed much to the literature of the subjects which they studied. Prof. W. Broniewski was a well-known Polish metallurgist, who played a large part in the public service of his country. Prof. R. V. Wheeler's work on fuel technology and particularly on combustion, with special reference to the causes and prevention of explosions in coal mines, had gained him an international reputation. Mr. E. Mond received high honours at the hands of the French and Belgian Governments during the war of 1914-18, and later he founded the Francis Mond professorship of aeronautical engineering at Cambridge in memory of his son, who was killed in 1918. Mr. E. Odelberg was well known in the Swedish mining industry, his services to which gained for him the Jernkontoret Gold Medal in 1925. Mr. J. E. Fletcher's contributions to the knowledge of the founding and properties of cast iron were of great benefit to the foundryman. Colonel J. G. Needham was a familiar figure on the Manchester Royal Exchange and the Birmingham Exchange.

Both expenditure and income have increased. Expenditure at £18,279 was £2,472 greater than in 1938 and £228 in excess of income. The increased expenditure was due to two main causes—first to the increase in membership and in service rendered to members, and secondly to the expenditure directly resulting from the occupation of the new offices at No. 4, Grosvenor Gardens. Various items of income increased. The sum payable by the Institute of Metals was £1,100 instead of £550: subscriptions increased from £6,709 to £6,829, and sales of publications from £1,532 to £1,763; gross contributions from the industry to the Special Subscriptions Fund were £4,166 instead of £2,853, and net subscriptions after making the usual transfers to reserve were £3,877 instead of £2,632. The account again shows how essential these Industrial Subscriptions are if the Institute is to maintain the service which it renders to members and to the industry.

Changes on the Council.—During the year the following changes on the Council were made: Mr. John Craig, C.B.E. (Vice-President), became President-Elect. Sir Edward J. George (Vice-President) and Mr. John E. James (Member of Council) were nominated Honorary Vice-Presidents. Mr. J. Sinclair Kerr and Mr. C. J. Walsh were elected Members of Council. Mr. L. F. Wright became an Honorary Member of Council on succeeding Mr. A. Scholes as President of the Cleveland Institution of Engineers, and Mr. G. R. Bashforth became an Honorary Member of Council on succeeding Mr. W. H. Lewis as President of the Staffordshire Iron and Steel Institute.



MR. JOHN CRAIG, C.B.E.
(*President of the Iron and Steel Institute*)

During the year the President of the Newport and District Metallurgical Society, and as from January 1, 1940, the President of the Swansea Technical College Metallurgical Society, were nominated Honorary Members of Council. Mr. G. H. Latham, President of the Newport Society, and Mr. O. J. Thomas, President of the Swansea Society, accepted invitations to become Honorary Members of Council during their terms of office.

In accordance with By-Law 10, the names of the following Vice-Presidents and Members of Council were announced as being due to retire at the annual meeting in 1940: *Vice-Presidents*—Sir William Larke, K.B.E.; Mr. A. O. Peech; Dr. C. H. Desch, F.R.S. *Members of Council*—Mr. E. J. Fox; Dr. T. Swinden; Dr. A. McCance; Mr. P. B. Brown; Mr. J. R. Menzies-Wilson. No other members having been nominated up to one month previous to the annual meeting, the retiring members were presented for re-election.

Andrew Carnegie Silver Medal.—The Andrew Carnegie Silver Medal for 1939 was awarded to Mr. O. W. L. Ljunggren for his Paper on "Method of Sclerograting Employed for the Study of Grain Boundaries and of Nitrided Cases; Grain Structures Revealed by Cutting."

Williams Prize.—The Williams Prize for 1939 was awarded jointly to Mr. W. B. Lawrie for his Paper on "The Refining of Metal in the Basic Open-Hearth Furnace. The Influence of Fluorspar on the Process," and to Mr. W. T. Wilson for his Paper on "The Rolling of Sections at the Appleby-Frodingham Steel Company, Limited."

Ablett Prize.—The Ablett Prize for 1939 was awarded to Mr. H. Escher for his Paper on "Ten Years' Development in Steam Engineering at the Port Kembla Steelworks, N.S.W., Australia." The Council have gratefully accepted the offer of Captain C. A. Ablett, O.B.E., B.Sc., M.Inst.C.E., Managing Director of the Cooper Roller Bearings Company, Limited, to renew his Prize for 1941. The Prize, of £50, is awarded for the Paper which, in the opinion of the Council, is the best Paper on a subject connected with engineering in iron or steel works, written by a junior engineer, whether or not he is a member of the Institute, the conditions being that the author of the Paper shall be a British subject and that at the time of presenting the Paper he shall be employed in an iron or steel works in Great Britain or the British Empire, that he is under 35 years of age and that he holds a position not higher than that of a departmental engineer.

Andrew Carnegie Research Scholarships, 1939

G. PARKER (The University, Leeds).—£100 in aid of a research on the determination of oxygen in steel (second grant).

A. LATIN (Department of Metallurgy, Manchester University). — £100 for a critical review of existing knowledge concerning the structure of ingots.

(The above researches are being carried out on behalf of the Joint Research Committees of the Iron and Steel Industrial Research Council and the Institute.)

F. L. GILLEMOT (Mechanical Technological Institute, Budapest, Hungary).—£100 in aid of a research on the influence of the base material and manufacturing procedure on the fatigue of wire ropes.

T. P. HOAR (Metallurgical Laboratories, Cambridge University).—£100 for a study of the conditions leading to intensive corrosion.

ANNUAL MEETING

MR. JAMES HENDERSON, who presided in the absence of Lord Dudley, who was indisposed, read the following telegram sent by his lordship:

"Lord Dudley taken seriously ill this morning and greatly regrets unable attend meetings to-morrow or luncheon on Friday. Please convey his apologies to all present."

The CHAIRMAN said he was sure the members would wish a message to be sent to Lord Dudley, expressing their sincere regret at his absence and their heartiest wish that he would quickly recover his usual health.

The CHAIRMAN suggested that, in accordance with the usual practice, the Report of Council and the minutes of the previous meeting should be taken as read. This was agreed.

D

Activities of the Institute

Continuing, MR. HENDERSON said it was imperative that the work of the Institute should continue during the war, because the Institute gave a very real and very valuable help to the iron and steel industry. In addition to long-range problems, the solution of which must take years to obtain, they were faced with special problems, answers to which were required without delay. The Institute was participating fully in the general research activities of the industry, and the sixteen committees and sub-committees for which the Institute was responsible were taking their full share, in tackling problems of immediate interest, including matters of special interest to the Services. They had been asked by the Department of Scientific and Industrial Research to maintain their pre-war programme as far as possible. On behalf of the members of the Institute, he thanked those who were giving so much of their time to this work.

It had been Lord Dudley's particular ambition, as President, continued the CHAIRMAN, to improve the finances of the Institute, and in May, 1939, he launched an appeal for a capital sum of £15,000, to meet the cost of the new offices, and for subscriptions of £4,000 from the industry. General support had been given, and he wished to tender the thanks of the Institute to all subscribers.

He formally moved the adoption of the report of Council and the accounts, and Mr. P. B. Brown seconded.

Induction of President

The CHAIRMAN said that as Lord Dudley's term of office was closing, the Council had invited Mr. John Craig to succeed him. He knew of no one who could fill this honourable position with more dignity. He could count on their help during what must necessarily be a difficult period of office, and one of critical importance to the Institute.

Mr. Henderson then vacated the chair, which was taken by the newly-elected President, Mr. John Craig.

The PRESIDENT said his first duty was to thank Mr. Henderson for the terms in which he had inducted him into the chair. He had now great pleasure in calling upon Sir Peter Rylands to move a vote of thanks to Lord Dudley for his services in the chair during the past two years.

SIR PETER RYLANDS said that not the least important duty of the annual meeting was to put on record their appreciation of the services rendered to the Institute by the retiring President, and it was unfortunate that Lord Dudley was unable to be present to receive their thanks, for they wished to express their appreciation in a more emphatic way than was generally the case. Lord Dudley during the last few years had rendered services to the iron and steel industry of incalculable value, and during his years of office he had discharged the duty of President with distinction and with great advantage to them all. The speaker recalled the very important part as President of the British Iron and Steel Federation which Lord Dudley had played in negotiations with the Cartel on the Continent and also with the Dominions, resulting in agreement to the great benefit of the industry which had stabilised the commercial position of the steel trade throughout the world. The outstanding work which Lord Dudley had done for the Institute was in connection with the removal from Victoria Street to the new magnificent offices in Grosvenor Gardens. It was very largely Lord Dudley's inspiration which had enabled that financial obligation to be met, and the Institute was greatly indebted to him.

CAPT. R. S. HILTON seconded the resolution.

Presentation of the Bessemer Medal

The PRESIDENT announced that the Council had decided to award the Bessemer Gold Medal for 1940 to Dr. Andrew McCance. The award was made in recognition of Dr. McCance's great services to the scientific study of the problems of steelmaking, with special reference to the application of the rules of physical chemistry to the open-hearth process and his critical examination of the thermo-chemical equations governing the process, and in recognition of the numerous contributions he had made to the Journal of the Institute and to other scientific publications; the researches he had conducted and the encouragement which he had given to research by others, his services to the steel industry in Scotland, including especially the introduction of the manufacture of alloy steel, and the valuable work he had done in introducing modern technical developments into British steelworks.

DR. ANDREW MCCANCE
(Bessemer Gold Medallist)

Dr. McCance, after graduating from the Royal School of Mines in 1910, became associated with Wm. Beardmore & Company, Limited, at Parkhead Forge, Glasgow, and was engaged mainly in the production of armour. At the conclusion of the war of 1914-18 he had gained an international reputation as a research metallurgist, and with the virtual cessation *pro tem* of the armour industry, he severed his connection with that company, to found, in association with David Colville & Sons, Limited (now Colvilles, Limited), the Clyde Alloy Steel Company, Limited, of which he became managing director, acting also as advisory metallurgist to the Colville company and its associated concerns. Some ten years ago he was elected to the Colville board and became general manager. Dr. McCance has contributed numerous scientific Papers to various societies, all of outstanding merit, his contributions on the theory of hardening steel, for which he received the degree of Doctor of Science (London) and on slag-metal reactions being particularly well known. He is a Fellow of the Institute of Physics, a member of the Council of the Iron and Steel Institute, a past-President of the West of Scotland Iron and Steel Institute, and serves on many technical and scientific committees.

The President, continuing, said that, personally, he would supplement the Council's recommendation, because he knew the great contribution which Dr. McCance had made to the industry as a whole, and particularly his contribution to the industry in Scotland. Although the Bessemer Gold Medal would ever be treasured by Dr. McCance as a high honour, there were other monuments to his greatness which would remain in Scotland long after the memory of the gold medal had faded, and they would be the works in Scotland which had been erected and which bore his stamp, carrying out his ideas and enabling the industry in Scotland worthily to maintain its place among the steelmaking industries of the whole world. Dr. McCance brought to his duties not only a highly-trained scientific mind, but a wonderful ability to mingle the science with the art.

DR. MCCANCE, in thanking the President and the Council of the Institute, said that to have one's name associated with that of Bessemer, no matter in how remote a degree, was an aspiration near to the heart of every metallurgist. In his own case, by being the recipient of the Bessemer Gold Medal, he felt he had achieved that aspiration, although the slender thread of association was merely a common interest in the practice and theory of steelmaking, a subject which he had always found full of attraction. To-day, as in the days of Bessemer, it must be admitted that the practice of the art was still ahead of the theory; but the gap between the two was lessening, and nowhere more so than in this country, where the standard of steelmaking technique was not surpassed by any other country. He greatly appreciated the President's remarks, though they were biassed too generously in his favour. Anything that he (the speaker) had been able to accomplish in the technical reorganisation of the steelworks with which both he and the President were associated, could never have been achieved without the President's help and encouragement, and it was a great pleasure to receive the medal at his hands.

Eugène Schneider Elected Honorary Member

The PRESIDENT announced that the Council had elected Monsieur Eugène Schneider, D.Sc., to honorary membership, in commemoration of the 50th anniversary of his becoming a member of the Institute.

The following telegram had been received by the President from Monsieur Schneider:—

"Please accept for yourself and convey to all colleagues my best wishes for a successful gathering. Greatly disappointed that unexpected circumstances prevent me joining you and expressing in person my heartfelt appreciation of the distinction conferred upon me by electing me honorary member. Permit me to offer my warmest congratulations to the British steel industry upon its splendid effort in support of the Allied cause.—SCHNEIDER."

It would be the wish of the members, said the President, that he should acknowledge that telegram and express their cordial appreciation of it and their renewed good wishes.

LUNCHEON AT GROSVENOR HOUSE

On Friday a luncheon, to replace the Annual Banquet, was held at Grosvenor House, Park Lane. Mr. John Craig, C.B.E., presided, the company numbering over 600. The principal guest was Sir William Bragg, President of the Royal Society, who proposed the toast of the Institute and the Iron and Steel Industry. In the course of his speech Sir William made reference to the better position in which this country now found itself as compared with the last war, so far as scientific instruments were concerned. He was satisfied with the adequacy of both the plant and scientific personnel of the iron and steel industry for the purpose of prosecuting the war. Mr. Craig replied to this toast, and proposed that of "The Guests." The reply was made by Rear-Admiral B. A. Fraser, C.B., the Third Sea Lord and Controller of the Royal Navy. He took the opportunity of recounting some of the recent exploits of the Navy, and made special reference to the brilliant work of the Fleet Air Arm. The foundry industry was well represented. Lord Austin of Longbridge, the president of the British Cast Iron Research Association, was sitting on the left of the chairman. Mr. W. B. Lake, J.P., the President of the Institute of British Foundrymen, was also at the high table. Others connected with the foundry industry similarly honoured were Prof. T. Turner; Dr. C. H. Desch, F.R.S.; Dr. A. McCance (Bessemer medallist)); Dr. W. H. Hatfield, F.R.S.; Lt.-Col. the Hon. R. M. Preston, D.S.O. (president, Institute of Metals);

(*Continued on page* 349.)

The New Research Laboratories of High Duty Alloys, Limited

As we briefly announced in our last issue, the magnificent research laboratories of High Duty Alloys, Limited, of Slough, were officially opened on April 30 by Sir Henry Tizard, F.R.S. This concern was started up about thirteen years ago by Mr. W. C. Devereux, and his reliance upon research was shown initially by the fact that his original staff consisted of twelve people of whom seven were metallurgical chemists.

Laboratory Buildings

The new laboratory buildings comprise four bays each 140 ft. long and having a span of 50 ft. Along the front of these bays is a two-storey block of administration offices and behind it are various outbuildings housing services, cloakrooms, air-conditioning and heating plants, etc. The bays are subdivided into various departments by hollow brick walls, the rooms having ceilings where desirable at 13 ft. 6 in.

This type of construction was chosen since it makes possible natural roof lighting in all departments and permits the concealment of all the ducts for the ventilation and extraction systems. The general colour scheme is green and cream, the former colour being used for doors, windows and other woodwork and for the lower parts of the walls, and the latter for the remainder of the walls and ceilings. The corridors have a dado finished with a particularly hard-wearing cement known as "Granitese." In certain departments the walls have been tiled, notably in the chemical laboratories where the tiling is carried up to the roof. Black tiles are used for the dado, the remainder being cream to match the general colour scheme. Special treatment has been accorded to certain departments, including the lecture theatre which is panelled in cork slabs, the library, which is finished in cream and natural oak, the damping laboratory which is entirely enclosed in aluminium sheet, and the various X-ray rooms which are lead lined.

The type of flooring used is largely governed by the special requirements of the various departments, but is generally of pinkadoe, beech or birch wood blocks, notable exceptions being the chemical laboratory bay and the colorimetric laboratory which have floors of "non-slip" corrosion-resisting tiles set in mastic. In the experimental foundry and heat-treatment department, red grano flooring has been used.

Special consideration has been given, throughout the building, to secure good and healthy working conditions in every department and to this end a highly efficient system of forced ventilation has been installed. This system supplies fresh air at constant temperature to all departments, thus eliminating the necessity of a separate central-heating installation, the absence of radiators making for improved appearance and cleanliness. In general, the air conditioning is at the rate of six changes of air per hour, but in certain departments where fumes are generated, the rate of change is increased. In the chemical laboratory, for instance, provision is made for twenty changes of air per hour by the air-conditioning installation, and this is still further augmented by the fume extraction plant, which can effect up to 130 changes of air per hour.

Particular attention has been given to the design of this fume extraction plant which not only operates from the fume cupboards and roof, but is also carried to all analytical and filtering benches where it extracts at bench level through controllable shutters, and at floor level. All the ducting of this system is of a special acid-resisting material known as "Urastone." Similar exhaust systems extract fumes from the foundry *via* hoods over the furnaces and casting floor; from the corrosion and protection laboratory *via* hoods over the chromating, anodising, electroplating baths and from the paint spray booth; and from the large etching sink in the metallographic laboratory.

The laboratory services are entirely self-contained and are independent of the works supply for gas, electricity, water, compressed air, etc. All mains are carried in a trench system, enabling all services to be extended to any part of the laboratories and permitting inspection or repairs to be carried out without breaking up the floors.

Electricity is available on three-phase and single-phase circuits and a special distribution board is installed for the low-voltage supply, making available a range of from 2 to 100 volts. Lighting has received considerable attention in order to provide adequate and efficient illumination at all times. During daylight hours all rooms are lighted naturally through day-lights while during black-out hours, illumination is provided from electric light fittings equipped with anodised aluminium reflectors, which are highly resistant to corrosion and which provide very efficient lighting. Where necessary, these reflectors provide illumination corrected to natural light. The welfare of the staff has been carefully considered and the accommodation includes a well-equipped rest-room and cloakrooms with shower-baths.

Library and Information Department

Included in the laboratory building is a well-stocked library in which is accommodated a large number of textbooks, publications of the learned societies, bound journals, and a large and valuable collection of pamphlets, patent literature, reports and manuscripts, the contents of which are classified and cross-indexed on an extensive card-index system. The library maintains an information service, available not only to the laboratories but also to the various works of the company and its associates and to outside organisations, and it acts as a clearing house for the exchange of all kinds of information.

Attached to the library is a well-equipped lecture theatre capable of seating in comfort about 100 students. Its equipment includes cinematograph, episcopic and diascopic projection apparatus. Lecture courses are arranged to give the students a thorough training in theoretical and practical metallurgy proceeding concurrently with practical training. At one end of the theatre is a conference room which is so designed that, when occasion demands, it can form an extension of the theatre. This is effected by folding doors and by this method the capacity of the theatre can be increased by 20 or 30 seats.

FIG. 1.—CHEMICAL LABORATORY—HIGH DUTY ALLOYS, LIMITED.

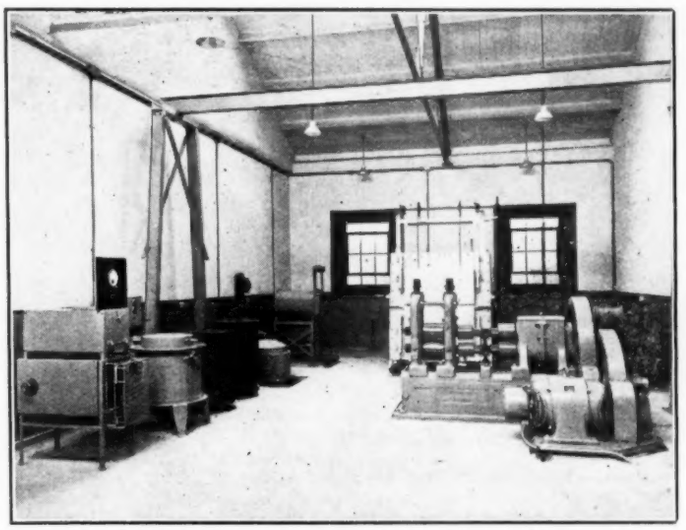


FIG. 2.—HEAT-TREATMENT AND ROLLING MILL DEPARTMENT.

Spectrographic Laboratory

To-day, for accurate routine analysis of certain light alloy constituents which offer difficulties in ordinary chemical analysis, quantitative spectrographic analysis seems to offer very definite advantages. In addition, qualitative analysis for a rapid survey of general composition, in particular for the detection of impurities, is of ever-increasing importance and the spectrographic method enables this to be done with the speed, reliability and economy necessary for large-scale application in practice.

The spectrographic department is equipped with two medium quartz spectrographs and, for the quantitative analysis, with four microphotometers for the measurement of spectrum line densities by means of photo-cells. For the qualitative analysis, two spectrum viewers and enlargers are provided which enable the spectro-

grams to be examined visually and photographed at twenty magnifications. For the development of the spectrographic plates, for which the highest accuracy in manipulation is essential, a special dark room is reserved. Furthermore, ample accommodation and equipment for the preparation of the specimens to be used for the spectrographic analysis are provided.

In this department, the routine analysis of a considerable proportion of the aluminium alloys produced by the company is carried out—in particular the analysis for magnesium, silicon and iron, the first two elements being those which are most cumbersome in wet chemical analysis. At present, about three hundred melts are being handled per day. The accuracy obtained is very satisfactory, the average error being of the order of 5 per cent. of the content of the element under review. This degree of accuracy has been achieved as a result of intensive research, and is maintained by rigid adherence to the details of the technique evolved by this research.

In this department also are manufactured the standard thermocouples which have been designed to meet the particular needs of this company's manufacturing processes. Adjoining the workshop is the calibration room, which is equipped to carry out rapid checks on the accuracy of the works' pyrometers and thermocouples. These thermocouples are withdrawn from service at frequent intervals for overhaul and re-calibration in this department.

X-ray Crystallographic Laboratory

In this department X-ray methods are used for the determination of the extent and the effects of cold-work and of the crystal orientation in cast, worked, and heat-treated samples of production materials and problems referring to re-crystallisation, grain growth and grain size are under investigation. Many results of practical use have already been obtained; in particular, those concerning the effects of working temperature and the conditions of heat-treatment, and methods have been evolved which enable a retrospective check on working conditions to be made. Systematic research work on the problems indicated is in progress.

The equipment of this department includes a crystal analysis X-ray unit provided with a number of X-ray tubes with targets of various materials and a number of special cameras adapted to the various investigations undertaken by this department.

Colorimetric Laboratory

While colorimetric analysis effected by comparing test solutions against standard solutions in white light has been practised for many years, it is only comparatively recently that methods of absolute colorimetry, by means of the accurate measurement of the absorption of monochromatic light in a given length of test solution, have come within the scope of technical application. These new methods render unnecessary the use of standard solutions and thus remove a possible source of error. Further, in the case of complex alloys, they make it possible to eliminate the influence of the other components present in the alloy by the choice of a suitable wavelength.

Although the advantages of these absolute spectro-chemical methods are obvious, for their technical application suitable apparatus for the rapid and accurate measurement of the absorption of monochromatic light of any desired wavelength had first to be designed. Also it was necessary to develop a reliable chemical technique for effecting the colour reaction by simple and rapid manipulation in an accurate and reproducible way.

In the colorimetric laboratory, which is equipped with several types of highly accurate spectro-colorimetric instruments, satisfactory techniques have been developed for the quantitative analysis of the iron and titanium contents of light alloys and these methods are now being introduced into the routine analysis of production materials.

FIG. 3.—SPECTROGRAPHIC DEPARTMENT.

FIG. 4.—CORROSION AND PROTECTION LABORATORY.

Besides these quantitative analyses the department also carries out a large amount of qualitative work, and many special tasks, such as micro-analyses and rapid analyses of melts while in the furnace, which may be completed in as short a time as twenty minutes, with the same accuracy as obtained in routine analysis.

Corrosion and Protection Laboratory

The equipment for corrosion testing includes a large continuous sea-water spray booth, intermittent sea-water spray cabinets, a special apparatus for the alternate immersion of specimens in various corrosive media; and an apparatus for testing the resistance of materials to erosion.

The protective treatment plant includes apparatus for anodic treatment, chromate treatment, electrodeposition of copper, brass, cadmium, zinc, nickel and chromium, and facilities for the spraying of paint and rubber.

The instrument workshop attached to these laboratories has been equipped with a wide range of machine and hand tools suitable for machining to the very close limits of accuracy required in this type of work, and is well provided with work benches equipped with all services. Besides the construction and maintenance of laboratory equipment, this department is responsible for the maintenance of the large number of pyrometric installations in the company's works upon which depends to a great extent the accuracy of control of melting and casting conditions, working temperatures and heat-treatment.

Damping Laboratory

Investigation into the damping capacity or internal friction of materials is one of the most recent branches of metallurgical research. In this laboratory, such investigations are carried out by means of electro-acoustic apparatus which enables the damping capacity of test specimens and manufactured components to be determined from the rate of decay of free oscillations as well as from the half-amplitude breadth of the resonance curve. This apparatus, which is believed to be the first of its kind in this country, is housed in a special room which is completely metal-lined to exclude all forms of electrical interference. For instance, no portable radio set will function in this room.

A comprehensive programme of research is being undertaken with the two-fold object of determining the damping capacity as a physical constant of a material in a given condition and of using this structure-sensitive quality as an indication of the state of the material in a component—notably with regard to strain, internal stresses, internal flaws, etc., thus providing a new means of non-destructive testing.

Experimental Testing Laboratory

This department performs two distinct, though allied functions. On the one hand long range research on a number of different lines is conducted here and, on the other hand, the department is equipped to carry out high accuracy static and dynamic mechanical tests.

Obviously the equipment of such a department will vary somewhat from time to time according to the types of research in progress. At the moment, this includes two specially designed high-temperature vacuum furnaces, the one heated by electrical resistance and the other being a 20-kw. high-frequency induction furnace.

The mechanical testing equipment includes an Avery 15-ton beam-type tensile testing machine, two Amsler Wöhler fatigue testing machines, an N.P.L. rotating fatigue testing machine, a battery of creep testing machines, and an Avery Brinell hardness testing machine.

Metallographical Laboratory

The routine work of this department is concerned with the examination of macro-structure and micro-structure of manufactured components with a view to their suitability for service. Besides the main metallographic examination room, the department also includes two rooms for preparation of specimens, an etching room, a photographic studio and two large dark rooms. Here photographs are taken of fresh types of castings with the runners and risers attached, so as to show visual imperfections. After alterations in moulding conditions, they are re-photographed, so creating a record of the steps taken to attain perfection. The metallographic equipment includes a Vickers projection microscope, a Zeiss Neophot microscope, a Beck metallurgical bench microscope, three workshop-type microscopes and a Beck binocular microscope mounted on a special universal support for the examination of large specimens and complete components.

Chemical Laboratory

The chemical laboratories occupy one complete bay and are equipped to carry out 500 complete analyses per day. Each of the six analytical and the four filtering benches has its own fume cupboard and reagent shelves. Considerable attention has been given to the question of cleanliness and to the prevention of attack by acid, and to this end the floors are of acid-resisting tiles and the walls are tiled up to the roof. The benches have "Vitrolite" tops. Wood has been entirely eliminated from the construction of the fume cupboards, which are built up of concrete faced with tiles with the metal frames painted with acid-resisting paint and lined with "Vitrolite" and "Sindanyo."

Great care has also been taken in regard to ventilation, and besides the normal air-conditioning arrangements common to the whole building, a special fume extraction plant has been installed which is capable of effecting 130 changes per hour. This plant, besides extracting from the fume cupboards and roof, has extractors arranged along the surface of every bench and at floor level.

A separate laboratory is also provided for routine electro-chemical analysis. In this laboratory is situated a five-bank electrolytic apparatus capable of 150 determinations per hour. This installation, which is the only one of its kind in the country, has independent totally enclosed motor control for each of its 50 units with independent transformers and rectifiers and electrically-heated controlled hot plates. There is a large chemical laboratory set aside for various research activities, such as the development of new and improved analytical methods.

Attached to the chemical laboratories is a spacious balance room containing twenty-four analytical balances, of which seven are of the prismatic type. The remainder of the bay is occupied by stores and stillroom with automatic still and storage tanks of 300 gallons capacity.

Experimental Heat-Treatment Department and Rolling Mill

In this department are situated two Wild-Barfield and one Siemens electric resistance furnaces with forced-air circulation, a recirculation gas furnace and a number of small electric muffle furnaces. These furnaces may be controlled with great accuracy by connecting them to a single instrument panel upon which are mounted sensitive potentiometric temperature controllers and recorders. The instruments on this panel may also be connected to furnaces in the works so that it is possible to keep a very accurate check on heat-treatment in order to investigate the problems which may occur in this connection.

The department also includes a small rolling mill for the preparation of strip for testing purposes, and a space is provided for further metal-working equipment.

In this department are studied the heat-treatment characteristics of various alloys and the effect of prolonged heating upon mechanical and physical properties. The rolling mill is used for a variety of experimental purposes, including the preparation of experimental wrought alloys and the study of hot- and cold-working characteristics.

This department, together with the experimental foundry, makes the laboratory independent of the works as regards the provision of materials for primary research.

Experimental Foundry

The equipment of the department consists of various types of gas-fired and electric resistance melting furnaces and an arc furnace. The main melting furnaces are situated in a pit along one side of the foundry, the tops of the furnaces project just above floor level, and over these and over the casting floor are canopies connected to the fume-extraction plant. A small sand-preparation plant is available, including an August sand mill and mixer and a small Rotoil machine.

Attached to this department is also a room housing the sand-testing equipment, on which are carried out daily tests to determine the quality of the moulding sands used in the various works foundries, and which is also available, of course, for research purposes.

The activities of the department include the preparation of experimental alloys, the investigation of casting properties, the development of casting methods and technique, the study, development and control of moulding sands and the preparation of standards for the analytical departments.

Mechanical Testing Laboratory

These tests include ultimate tensile strength, 0.1 per cent. proof stress and elongation in addition to which all test-pieces must be tested for hardness for comparison with the hardness figures of every component in the batch which it represents.

The equipment of this department includes three Amsler hydraulic universal testing machines; two are of 15 tons and one of 30 tons capacity; a 4-ton capacity Avery sheet-testing machine; a Hounsfield Tensometer; Brinell hardness testing machine, and various extensometers and the necessary gauges and measuring instruments.

Test-pieces are prepared in the works on high-speed automatic lathes to close limits. When the test-pieces come into this department, they are checked for dimensions and marked with the appropriate gauge length. The 0.1 per cent. proof stress is determined by plotting the stress-strain curve from extensometer readings, and after the extensometer has been removed, the test-piece is broken, the readings taken for ultimate stress and the elongation measured.

Radiographic Laboratory

One of the most recent developments in inspection methods, radiological examination has already exerted a profound influence on the quality of metallurgical products. Intelligent interpretation of radiographs and collaboration with the foundrymen have produced a marked improvement in the soundness and general quality of all types of castings, and this method of non-destructive testing is now included in the routine inspection of all highly stressed cast components.

The equipment includes X-ray tubes of 100 k.v., 150 k.v. and 200 k.v. capacity, each of which is housed in a separate lead-lined room with the controls situated outside in order to avoid possible ill-effects of the X-rays upon the operators.

A notable feature of this department is the screening table equipped with a conveyor belt system. By this means, castings are fed on to the belt and pass under the viewing screen for examination. Remote control is provided by means of which the operator can manipulate the castings under the screen to any required position and can maintain them there until he is quite satisfied as to their soundness or otherwise, in which latter case he operates the mechanism which rejects the castings.

Spacious dark-room accommodation is provided, and there is a drying room in which the temperature can be maintained at 90 to 95 deg. F. to permit the rapid drying of radiographs.

Government's Priority Organisation

COMPREHENSIVE SYSTEM PREPARED

Allied military strategy, general civilian commerce and the public purse suffered during the 1914-18 war for want of a priority organisation carefully planned in advance. When, as is inevitable in war, the normal flow of materials was impeded and the normal demands upon labour resources and industrial capacity were thrown out of balance, adaption to wartime conditions was by no means as swift, sure and orderly as, with planning, it might have been. Belatedly and piecemeal a priority organisation was set up as the war of 1914-18 went on. This time a comprehensive organisation was planned and in existence before war broke out.

The Government Priority Organisation is extensive. At the head of it is a Cabinet Ministerial Priority Committee. This Cabinet Committee has two functions. It lays down general priority directions in accordance with Cabinet policy, and it acts as the final appeal tribunal after decisions of the Priority Sub-committees (for competing claims formulated by the Service and other Government Departments). Under the Cabinet Ministerial Committee are six Priority Sub-committees, dealing with man-power, production, materials, labour, transport, and works and building respectively. On these Sub-committees all the interested Government Departments are represented, so that the special needs of each may be advocated and envisaged. There is also a department known as the Central Priority Department, which is responsible for the general administration of the priority system on behalf of all Departments. No priority certificate can be issued without a notification from this Department, and it is also responsible for the allocation of manufacturing capacity between departments.

If priority certificates should become necessary during the present war, the system under which principal and subsidiary priority certificates are to be issued and the classes into which priority orders are to be divided are set out in the Priority of Work Order, 1939, made by the Minister of Supply under the Defence Regulations. But this general system of priority has not yet become necessary, and it is not at present intended to issue priority certificates on any substantial scale.

The Iron and Steel Institute

(*Continued from page* 346.)

Mr. Asa Binns (president, Institution of Mechanical Engineers); Mr. Ashley Ward, the Master Cutler; Col. Sir W. Charles Wright, Bt. (Controller of Iron and Steel); Captain R. S. Hilton (president, British Iron and Steel Federation); Sir William Larke, K.B.E.; Dr. H. J. Gough, F.R.S. (Director of Scientific Research, Ministry of Supply), and Dr. T. Swinden. Amongst those present who have held office in the Institute of British Foundrymen were: Mr. V. C. Faulkner and Dr. J. E. Hurst (past-presidents) and Prof. J. H. Andrew; Mr. V. Delport; Mr. A. Firth; Mr. J. W. Gardom; Mr. Barrington Hooper; Mr. J. F. Kayser; Mr. C. H. Kain; Mr. W. T. Kitchin; Mr. J. G. Pearce (director, British Cast Iron Research Association), all past branch presidents.

Influence of Ladle Additions on the Properties of Cast Iron

By E. PIWOWARSKY

(*Continued from page* 327.)

Six transverse test-bars, 30 mm. (1.18 in.) in diameter and 700 mm. (27.5 in.) long, twelve impact test-pieces, with and without notch (Figs. 6 and 6A), two hot-strength test-pieces (American pattern, Fig. 7), two shrinkage cavity bars, of Sipp pattern (Fig. 8), two step test-bars (Fig. 9), two shrinkage cavity test-pieces of the Bültmann pattern (Figs. 10 and 11), and six fluidity test spirals of the Sipp pattern (modified pattern, Fig. 12) were cast in each experiment.

The transverse bars were bottom-cast three in a box by the method of K. L. Zeyen.[5] Figs. 6, 7, 9, 10 and 12 show the gating and arrangement of the runners for the various test-pieces. The tensile bars were machined from the ends of the transverse bars as shown in Fig. 13.

The primary structure of all the specimens was pearlitic. The strongly graphitising effect of the ladle additions could be observed in all

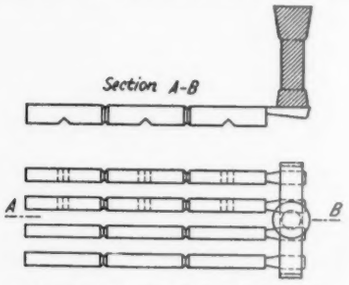


FIG. 6.—TRANSVERSE BARS WITH RUNNER.

the melts. The charge mixtures for melts 11, 12, 21 and 22, for a wall thickness of 30 mm. 1.18 in.) (transverse bars) are still in the mottled region or at the boundary of the pearlitic area of the Maurer diagram as modified by Uhlitsch and Weichelt[6] for relatively small section thicknesses. The desired graphite formation must thus have been largely produced by the additions. In no case was any increase in the fineness of the graphite to be observed.

Lithium appears not to exercise any pronounced influence on the graphite formation.

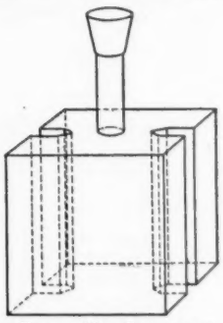


FIG. 10.—SHRINKAGE CAVITY TEST-PIECE.

Melt L even has a somewhat hyper-eutectoid carbide content and comparison with melt 25 would rather lead one to conclude that lithium exercises a graphite inhibiting influence, although it should not be forgotten that the lithium was alloyed with lead.

With the exception of the low-carbon melt 23, which was not treated in the ladle, and melt L, both of which were obviously very considerably undercooled and exhibit a eutectic or reticular graphite arrangement, the other specimens exhibited an absolutely unorientated graphite distribution, of more or less coarse structure, depending upon the section thickness. The marginal structure of the 20 mm. (0.78 in.) section thickness alone exhibited in the case of the low-carbon melts 21 and 22, a somewhat reticular arrangement of the graphite flakes.

The difference between melts 23 and L and the other melts is also well marked in the primary crystallisation. The former solidified in globulitic form, while the latter are conspicuous for the unorientated graphite distribution and exhibit a dendritic primary structure. Primary etching was carried out, after polishing, by the method of Jurich.[7]

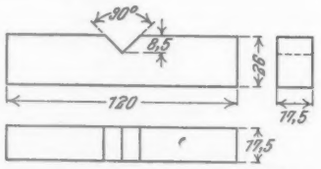


FIG. 6A.—TRANSVERSE BAR WITH NOTCH.

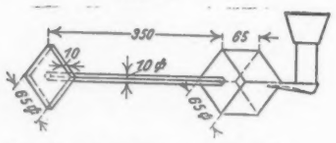


FIG. 7.—HOT-STRENGTH TEST-BAR.

It was conjectured that the globulitic type of solidification was to be regarded as due to crystallisation with considerable undercooling, The dendritic form being due to less pronounced undercooling.

To clear up this question, three 30-kg. (66-lb.) melts were carried out in an oil-fired crucible furnace. Analysis of the untreated melts gave the following figures:—

Designation.	C. Per cent.	Si. Per cent.
T_0	2.57	1.60
T_{00}	2.57	1.66
T_{034}	2.57	1.55

Melt T_0 was tapped after heating to 1,450 deg. C., and two 30-mm. (1.18-in.) round bars were cast at 1,350 deg. C., the remainder was

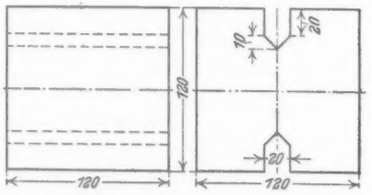


FIG. 11.—SHRINKAGE CAVITY TEST-PIECE.

heated up again, again tapped, treated at 1,410 deg. C. with 0.45 per cent. CaSi (referred to Ca + Si), and two further test-bars were cast (T_1). The untreated melt exhibited a globulitic primary structure and reticular graphite arrangement, exactly like melt 23, while the treated melt had a dendritic primary structure and unorientated graphite.

The same result was obtained with melt T_{00}, which, to vary the programme, was treated with 0.3 per cent. FeTi (referred to Fe + Ti), but which otherwise was subjected to the same procedure.

Of the third melt, T_{034}, three test-bars were cast, the first untreated, the second also without additions, but with powerful agitation before and during pouring, and the third with an addition of 0.6 per cent. FeSi (referred to 96 per cent. ferro-silicon). It was found that the influence of mechanical agitation on the primary crystallisation was as great as that of the addition of ferro-silicon.

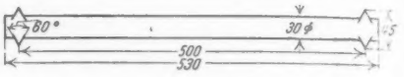


FIG. 8.—SHRINKAGE TEST-PIECE.

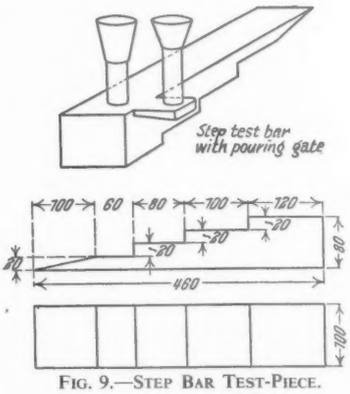
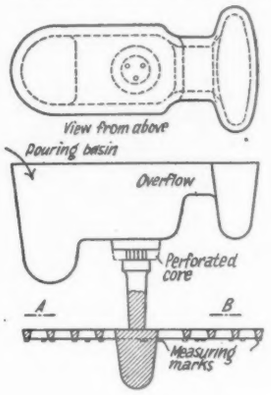


FIG. 9.—STEP BAR TEST-PIECE.



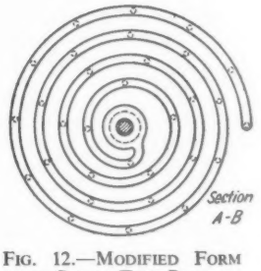


FIG. 12.—MODIFIED FORM OF SPIRAL TEST-PIECE.

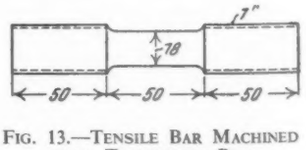


FIG. 13.—TENSILE BAR MACHINED FROM TRANSVERSE BAR.

Crosby and Herzig[8] also found that in untreated material, the graphite is arranged in a reticular dendritic formation, but that, after the

(*Continued on page* 352.)

A New Light Castings Foundry

WARTIME ENTERPRISE AT DUDLEY

About 20 years ago, Mr. Thomas Dudley started an ironfoundry business, about a mile away from his new premises, which now occupy an excellent site on the Wolverhampton by-pass road at Dudley. In 1920, the concern was registered as a limited company, Thomas Dudley, Limited, and has continued to make steady progress. The change from the old foundry at Groveland Road, Dudley Port, to the new premises has been gradual, and two or three bays of the foundry have been used for some time.

The new site allows plenty of room for further extensions, and, at the moment, use has been made of a portion of it to provide first-class air-raid shelter for the employees. The buildings now consist of nine bays, 150 ft. long by 40 ft. wide and 16 ft. high to the eaves. Each bay is ventilated by a longitudinal aperture surmounted by an arch of corrugated sheeting. The system is effective, and the natural lighting is eminently satisfactory.

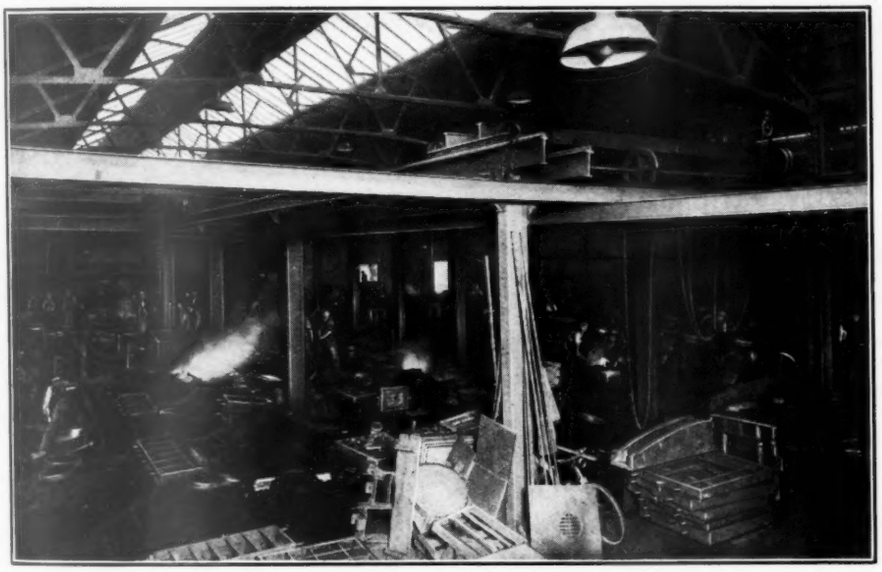


FIG. 1.—THE NEW FOUNDRY OF THOMAS DUDLEY, LIMITED, DUDLEY.

The offices, which separate the foundry from the main road, are of modern steel and glass construction.

The general arrangement of the external transport is that the raw materials for the cupola and the moulding sand arrive at the right-hand side of the offices, and a ramp has been constructed so that the cupola charging platform is but little higher than the stocking ground. The final method of handling these raw materials is still under consideration by the board of directors. Fettling is effected along the side of the foundry, opposite to the cupolas, and the finishing operations and despatch are carried out in shops at the left-hand side of the offices.

Melting

Melting is effected, at the moment, by two 3 ton per hr. cupolas driven by direct-coupled Alldays & Onions fans. One is of the solid-bottom and one of the drop-bottom type. Everything is ready for the installation of a 6 ton per hr. Pneulec plant. The present furnaces, which work with a 10 to 1 ratio, carry two rows of tuyeres, and are producing good hot metal well suited to the heavy production of such castings as flushing cisterns, firegrates and conveyor troughs. Production of the order of 120 tons of castings per week has been maintained. The metal is caught in monorail-suspended ladles of 5-cwt. capacity, and this system serves the whole of the foundry. In teeming the lighter castings, the metal is transferred to 40-lb. hand shanks.

One bay is spanned by a 3-ton and 2½-ton hand-operated crane. At the time of our visit, this bay was being used for the making of conveyor troughs, 2 ft. 6 in. wide and 8 ft. long.

Moulding

Much of the moulding is done by loose patterns, often of the highly-finished metal type, made in the firm's patternshop, the metal being melted in two Morgan coke-fired pit furnaces installed in a corner of the shop on the melting side. In addition to a number of Adaptable stripping machines, there are now in operation two pairs of Tabor (Macnab) jar-squeeze moulding machines. Green-sand moulding only is used, and the moulders, each operating his own section of the floor, prepare their own sand, make their moulds, teem them, and knock out the castings. Facing sand is prepared in a corner of the first bay, in a 6-ft. dia. pan mill.

The type of work undertaken does not entail much core making, and, moreover, most of it is of a light character. For baking cores, there is a modern, 3-ft. square by 4-ft. high gas-fired Ballard oven, the temperature of which is controlled at 200 deg. C. In addition, there are two home-made coke-fired ovens. Near the heavy bay there is a large stove specially reserved for lamp-standard work. At the moment, there is not much demand for this class of casting.

Cleaning and Finishing

Instead of creating a special fettling department, the system adopted has been to place at the end of each bay the machinery best adapted for handling the production made in it. Thus, in one position there is a battery of three double-cased rumbling barrels of 2 ft. 6 in. dia. by 4 ft. long, whilst at the end of others there are installations of "Beacon" grinding machines and a polisher. In connection with these machines, there is a very interesting and efficient example of unit dust extraction. These simple machines eliminate the usual duct work, and they cannot be said to occupy an excess of space. Not quite so big as a standard pillar box, the plant consists essentially of aspirating the dust-laden air through a bag suspended within a vertically disposed cylinder. Weekly cleaning is practised. The machines are made by James Lister, of Tipton.

Ancillary Departments

A very large business, for both home and export, is carried out in flushing cisterns, and, as some of the components require a certain amount of machining, special-duty plant has been installed. Moreover, there are spraying booths and stoves for applying the several types of finishes required by the merchants.

The patternshop and stores are separated by a passage leading from the foundry to the despatch, a situation admitting of the easy control of every individual pattern.

Congratulations are due to the directorate for their enterprise in extending the manufacturing facilities during a period like the present, whilst the writer's thanks are accorded to Mr. T. Dudley, jun., for the help given to him in the preparation of this article.

Book Review

Non-Ferrous Foundry Practice. By J. Laing and T. R. Rolfe. Published by Chapman & Hall, Limited, 11, Henrietta Street, Covent Garden, London, W.C.2. Price 21s. net.

This book, which is the outcome of years of study on the part of the authors—one a practical non-ferrous foundryman and the other a metallurgist—fills a long-felt want for an up-to-date book covering this branch of the foundry industry. An examination of its chapters describes the developments, present position and properties of:—Non-ferrous moulding sand; non-ferrous melting furnaces; bronzes; copper; straight brasses; high-tensile brasses (manganese bronze); aluminium bronze, silicon bronzes; nickel silver, German silver, white brasses; nickeline, etc., and copper-nickel; aluminium and magnesium alloys.

The metallurgical aspects of the various alloys, including constitutional diagrams, structures and chemical properties, have been well chosen. The latest physical and chemical specifications for the different alloys can be readily found and these when tabulated are more convenient than when they exist as numerous separate specification sheets.

The practical factors of gating, feeding and moulding technique for making satisfactory moulds for the different alloys in the non-ferrous foundry are fully explained. The examples published by the authors are valuable practical illustrations, and may be applied in any foundry with distinct advantage.

The chapters on aluminium and magnesium alloys cover the latest light-alloy foundry practice and should be of valuable assistance to the foundryman manufacturing that type of casting. Pyrometry and temperature measuring instruments, essential in non-ferrous foundry practice, are insufficiently stressed, and probably this and reference to the development of X-ray technique in the study of light-alloy structures would be desirable additions in a future edition.

A. PHILLIPS.

Institute of British Foundrymen

WEST YORKSHIRE BRANCH ANNUAL MEETING

The annual general meeting of West Riding of Yorkshire Branch of the Institute of British Foundrymen was held on April 27, at Bradford Technical College, under the chairmanship of the Branch-President, Mr. S. Carter, of Huddersfield.

The meeting unanimously approved the action of the Council in sending a letter of sympathy and good wishes to Mr. Paul Durrans, one of the Branch's two members on military service, and who had entered hospital for an operation.

Annual Report

MR. S. W. WISE (Hon. Secretary), submitting his annual report, said the past year was a difficult one to report upon because the opening of the winter session coincided with the outbreak of war and general upheaval in the industry and in national affairs. From the start of the year there had been the shadow of impending war, and when it had become a reality it had inevitably had disturbing effects on affairs in the industry and on the foundry industry as a whole. All classes of foundrymen in the Branch area were, in common with others in the Institute, doing their utmost to help in the great effort to bring about a successful issue to the gigantic struggle for the maintenance of human liberty.

In spite of severe handicaps the Council, supported by the bulk of members, had decided to carry on the winter programme as near to its planning as practicable and with the exception of certain contemplated works visits this had been done with outstanding success. Meetings during the winter black-out had been held in afternoons instead of evenings and attendances had been excellent, members making light of unusual travel and other difficulties. The annual dinner had been held as usual and the Branch was congratulated by headquarters on being the first in the Institute to maintain this valuable social gathering of members, with their ladies and friends, in face of war conditions and weather conditions on the day concerned which were exceptionally bad. The Branch membership continued to increase steadily and now numbered 160.

Thanks were due to Mr. S. Carter and Mr. N. W. Riley for gifts to the Branch technical library, and great credit was due to all responsible for the valuable volume of Proceedings recently issued by the Institute. Mr. Wise voiced thanks to all members of the West Riding Branch for help and co-operation in the year's work; and to Mr. H. Richardson, Principal of Bradford Technical College, for his continued kindly interest in the Branch's work—especially on the educational side for the younger members—and for facilities for the meetings and lectures.

The financial statement, also submitted by Mr. Wise, showed a credit balance on the year of £10 6s. 11d.

The President, moving adoption of the reports, paid warm tribute to Mr. Wise for his stalwart service as Hon. Secretary and Treasurer.

Election of Officers

MR. H. A. MACCOLL, B.Sc., now of Walsall and late of Bradford Technical College, was unanimously elected the new Branch-President, and tribute was paid to him for his sustained and active part in the work of the Branch under difficulties of travel. The meeting noted with pleasure that Mr. MacColl had been elected as Hon. Secretary to the Staffordshire Iron and Steel Institute.

Other officers elected for the coming year were: *Senior Vice-President,* Mr. W. Fearnside (Keighley); *Junior Vice-President,* Mr. F. Oldershaw (Wakefield); *Hon. Secretary and Treasurer,* Mr. S. W. Wise (Bradford); *New Members of Branch Council,* Mr. L. Turner (Elland), Mr. J. Blakiston (Halifax), Mr. Joe Smith (Keighley), Mr. G. Copeman (Leeds) and Mr. H. Balme (Huddersfield); *Hon. Auditors,* Mr. H. Forest and Mr. W. G. Thornton; *Hon. Librarians and Registrars,* Mr. E. Bradbury and Mr. F. Squires; *Delegates to the General Council of the Institute,* Mr. W. G. Thornton (Bradford) and Mr. A. S. Worcester (Huddersfield); *Representatives to the Technical Committee,* Mr. S. Carter (Huddersfield) and Mr. H. Forrest.

MR. CARTER, retiring from the chair, thanked the members of the Council and of the Branch for friendly support during a session fraught with many anxieties and doubtless a great call on their time and attention in their own affairs. He had never expected to be a wartime President of the Branch and he hoped conditions would be much happier by the time his successor reached the end of his year of office. Mr. Carter renewed a hope he had expressed on taking the chair a year ago—that more of the younger members would take an active part in the discussions. It was the duty of all to see they did not leave any meeting with the unspoken thought on any point which might offer enlightenment to others or produce further knowledge for themselves.

Institute Elects New Members

At a meeting of the Council of the Institute of British Foundrymen, held at the Queen's Hotel, Birmingham, on April 20, the following were elected to the various grades of membership:—

As Subscribing Firm Members

Benoni Engineering Works & Steel Foundry (Pty.), Limited (H. H. Waters, works manager, representative); Mandy Engineering Works (Pty.), Limited (L. A. Mandy, managing director, representative); Ernest Newell & Company, Limited (P. Howden, works manager, representative).

As Members

G. F. Alexander, managing director, Perfection Piston Manufacturing Company, Johannesburg; A. Atherton, works manager, Andrew, Thomson & Scougall (Pty.), Limited; G. H. Crump, master patternmaker, Lonsdale Street, Salford; H. E. Hicks, representative, T. & I. Bradley, Limited; R. S. Darby, iron merchant, Darby & Company; J. D. A. Howie, chemist and metallurgist, Mirrlees Watson Company, Glasgow; C. L. Clarke, director, Corn Products Company, Limited; H. R. Harris, London manager, Shaw Glasgow, Limited; S. B. Rosser, representative, Sternol, Limited; R. Smellie, foundry foreman, A. G. Wild & Company, Sheffield; K. E. Walker, analytical chemist, Wolsingham Steel Company, Limited, Co. Durham; C. E. Williamson, works manager, A. Baird & Son, Limited, Hamilton; J. Blakiston, manager, Modern Foundries, Limited; G. H. Gardner, cupola foreman, Cochranes (Middlesbrough) Foundry, Limited.

As Associate Members

J. Baldwin, brass moulder; J. Band, foreman patternmaker, Leyland Motors, Chorley; H. Broadhead, patternmaker, S. Fox & Company; G. H. Clubley, chief chemist, Davy & United Roll Foundry; C. F. G. Drewery, pyrometric engineer, Rolls-Royce, Limited, Hillington; E. Eastwood, assistant metallurgical chemist, Hepworth & Grandage, Bradford; H. Hurst, foundry foreman, D. Brown (Brownall), Limited, Manchester; C. S. Johnson, assistant metallurgical analyst, Hepworth & Grandage, Bradford; Wm. Jones, apprentice moulder, Hepworth & Grandage, Bradford; H. Mason, foreman moulder, Dorman & Smith, Limited, Salford; G. A. M. Mitchell, B.Sc., metallurgist, Rolls-Royce, Limited, Hillington; J. E. Morgan, technical assistant to foundry manager, Rolls-Royce, Limited; E. Smith, analyst, Metal Industries, Jarrow; E. A. Soteye, moulder, Foundry Office, Mechanical Department, N.R.; A. Cluley, foundry foreman, Qualcast, Limited, Derby; H. K. M. Aspden, draughtsman, M. & E. Services; F. Bishop, foreman moulder, W. & J. F. Jones, Limited, Pendlebury; J. Blackett, jun., assistant foundry manager, Blackett, Hutton & Company, Limited; A. H. Cannard, moulder, Brown, Lenox & Company; W. Cooper, foreman patternmaker, Platt Bros.; W. W. Davies, moulder, Brown, Lenox & Company; R. Ervine, moulder, Rolls-Royce, Limited; L. O. Hancher, foundry inspector, Rolls-Royce, Limited; J. Henderson, chemist, Crane, Limited; J. C. Linnard, metallurgist, Crane, Limited; E. Pate, machine moulder, Brown, Lenox & Company; A. J. Price, moulder, Metropolitan-Vickers, Limited; A. H. Whittingham, foundry superintendent, Rolls-Royce, Limited; J. H. Geeves, metallurgist, J. Maddock & Company, Limited; C. W. Hicks, metallurgist, Humber, Limited; D. S. McInnes, chief ratefixer, Crane, Limited.

As Associates

J. R. Plumb, patternmaker, S. Platt, Limited; S. M. Beck, castings inspector, Ley's Malleable Castings Company, Limited; W. Burgess, apprentice moulder, Craven Bros. (Manchester), Limited; C. P. Robinson, junior chemist, Crane, Limited.

As Associates (Students)

C. Badcott, apprentice moulder, Brown, Lenox & Company; R. Gould, apprentice moulder, Brown, Lenox & Company; J. Greatrex, apprentice moulder, Brown, Lenox & Company; W. A. Robotham, apprentice moulder, Brown, Lenox & Company.

Influence of Ladle Additions on the Properties of Cast Iron

(*Continued from page* 350.)

addition of a small quantity of calcium-silicon in the ladle, it separates in the form of irregularly distributed flakes. Valenta and Chvorinov[9] referred to melts treated with ferro-silicon in the ladle as normally graphitising, *i.e.*, "the structure exhibited graphite flakes and no tendency to undercooling."

To sum up, therefore, it may be said that the more strongly hypo-eutectic a cast iron is, the more does the graphite incline to adopt a reticular arrangement. If solidification also occurs quietly, that is to say, without any violent shaking or agitation, a globulitic primary structure is generally formed. In the other case, the primary structure assumes a dendritic character, the graphite arrangement passing from the predominantly eutectic or reticular character into the unorientated character with a uniform distribution of the graphite in the primary structure.

By deep etching with nitric acid, the phosphide network was also exposed and, in agreement with Piwowarsky,[10] Nipper and Patterson, it was found that the meshes of the phosphide network increase in size with increasing section thickness, *i.e.*, with decreasing rate of cooling.

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[8] V. A. Crosby and A. J. Herzig: "Foundry," 66 (1938), p. 28.
[9] E. Valenta and N. Chvorinov: FOUNDRY TRADE JOURNAL, 57 (1937), p. 228.
[10] E. Piwowarsky: "Hochwertiger Grauguss" (Verlag Julius Springer, Berlin, 1929), p. 119.

(*To be continued.*)

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The Week's News in Brief

Trade Talk

GRAHAMSTON IRON COMPANY, LIMITED, Falkirk, are to extend their patternshop.

A MEMORIAL to the late Mr. W. H. Scott, founder of Laurence, Scott & Electromotors, Limited, has been unveiled at the Gothic Works, Norwich.

THE NATIONAL SAFETY FIRST ASSOCIATION is holding a one-day National Safety Congress in London on May 17.

A SERIOUS EXPLOSION took place at the Shields Foundry, owned by Motherwell Foundry Company, Limited, and was stated to be due to an accumulation of gases in a coal-fired drying stove.

THOMAS FRANCIS & COMPANY, LIMITED, malleable-iron founders, of Leeds, celebrate their bicentenary this year. The business was founded in 1740 by Thomas Francis at Birmingham and removed to Leeds in 1933.

THE QUASI-ARC COMPANY, LIMITED, and the Ferro-Arc Welding Company, Limited, between whom there has for a long time been a close relationship, have now amalgamated, under the name of the Quasi-Arc Company, Limited, as from May 1, 1940. The quality and the individual characteristics of the Quasi-Arc and the Ferro-Arc electrodes will, of course, be maintained in the future. Actually, during the last year, the electrodes marketed by the two companies have been manufactured in the same factory.

WORKMEN of the Iron and Steel Trades Confederation are solidly behind the country in their effort to produce the material to win the war, said Mr. John Brown, general secretary of the Confederation, at the annual conference of No. 3 Division held in Sheffield recently. Although it was against their principles to work overtime, they were willing to make their contribution towards the war effort in spite of the fact that the rate of overtime payment in the steel trade was substantially less than in many other trades. They had for the time being surrendered the sliding scale agreement which had regulated wages in the steel trade since 1905. It was realised on the part of the workmen as well as the employers that wages could never attempt to win the race in the matter of rising prices. It could be safely said that no matter what the spiral of rising prices happened to be at present, it was not due to outrageous demands made by workers in the steel trade for wage increases.

Removal of a Director

The House of Lords has given its judgment upon the appeal of Southern Foundries (1926), Limited, of Croydon, and Federated Foundries, Limited, of Glasgow, against a majority decision of the Court of Appeal affirming Mr. Justice Humphrey's decision awarding the respondent (Mr. Alan Shirlaw, Woodcote Park Avenue, Purley) £12,000 damages and costs against appellants for breach of an agreement under which he was appointed managing director of Southern Foundries for 10 years from December 21, 1933, at a commencing salary of £1,700, rising by annual increments of £100 to £2,000, with a commission of 5 per cent. on the net profits of Southern Foundries available for dividend.

Upon the amalgamation of 11 foundries in 1937 (including Southern) under the control of Federated Foundries, Limited, the latter, after the amalgamated foundries had all altered their articles of association, purported to remove Mr. Shirlaw as a director of Southern Foundries under the power given to them by the alteration in the articles of association of the amalgamated subsidiaries. Mr. Shirlaw contended that the alteration in the articles of association did not affect his rights under the 10-year agreement with Southern Foundries.

Lord Atkin gave judgment in support of his view that the appeal should be dismissed, and Lord Wright and Lord Porter delivered judgments agreeing with Lord Atkin. Viscount Maugham and Lord Romer gave judgment saying they would allow the appeal. The appeal was accordingly by a majority dismissed with costs.

Personal

MR. G. M. MENZIES, managing director of the North British Steel Foundry, Limited, Bathgate, was the recipient of a solid silver tea service from the staff and employees on the occasion of his marriage to Miss A. W. Mitchell.

MR. JAMES F. INSCH has been appointed secretary of the Scottish Stamping & Engineering Company, Limited, Ayr. He joined the company last year and succeeds Mr. Robert Macnair as secretary. Mr. Macnair, who held the post for 20 years, has retired.

MR. T. MAKEMSON, A.M.C.T., has been appointed to assist Mr. FitzHerbert Wright, the Director for Iron Castings (Ministry of Supply—Iron and Steel Control), for the duration of the war. He retains his interest in the secretariat of the Institute of British Foundrymen in a consulting capacity.

BRIGADIER-GENERAL H. A. JONES has been appointed Controller of Light Alloys. He will be assisted by an advisory committee which is to include Mr. H. W. Clarke, Mr. W. C. Devereux, Mr. F. S. Mitman and Mr. P. Pritchard. These gentlemen have up to the present acted as voluntary part-time Controllers of Light Alloys.

MR. M. HENDERSON CLARK, of Middlesbrough, who at the recent annual conference was elected President of the National Federation of Scrap Iron and Steel Merchants, has taken an active part in the organisation, both locally and nationally, for many years. From 1935 to 1938 he was President of the North-Eastern Association, on the committee of which he has served for 10 years, and he has been a member of the management committee of the National Federation since its formation three years ago.

Wills

SAPH, E. R. G., of Briton Ferry, iron merchant	£34,142
RUSSELL, R. T., director of R. Russell & Sons, Limited, ironfounders, of Derby	£30,247
MORRIS, WILLIAM, of Morriston, Swansea, a former chairman of the Welsh Tinplate Association	£160,145
MACPHERSON, W. G., of Glasgow, for 20 years Glasgow representative of the United Steel Companies, Limited ...	£34,535

Reports and Dividends

Heenan, Beddow & Sturmey, Limited—Dividend of 5 per cent.

Moss Gear Company, Limited—Interim dividend of 5 per cent.

Alley & Maclellan, Limited—Final dividend of 7½ per cent., making 15 per cent.

Cochran & Company, Annan, Limited—Interim dividend of 2½ per cent., tax free.

Park Gate Iron & Steel Company, Limited—Dividend for the year to March 31 last of 5 per cent.

Pressed Steel Company, Limited—Final dividend for the year 1939 of 17½ per cent., making 27½ per cent.

Garrard Engineering & Manufacturing Company, Limited—Final dividend of 12½ per cent., making 25 per cent.

F. Francis & Sons, Limited—Net profit for 1939, £46,521; final dividend of 8½ per cent., making 12½ per cent.

Anti-Attrition Metal Company, Limited—Interim dividend of 3¾ per cent. on account of the year ending July 31.

Mellowes & Company, Limited—Final dividend on the ordinary shares of 15 per cent., making 25 per cent. for 1939.

Elmore's Metal Company, Limited—Profit on trading for 1939, £1,732; brought in, £13,559; carried forward, £13,987.

Metal Agencies Company, Limited—Final dividend of 7½ per cent., and a cash bonus of 7½ per cent., making 22½ per cent.

Metal Closures, Limited—Profit for 1939, £36,706; final dividend of 7½ per cent., making 12½ per cent. for the year.

Contracts Open

Smethwick, May 11—Mild-steel tubes and fittings, malleable-iron fittings, mild-steel bars, sheets and plates, and cast-iron pipes and specials for the year ending June 30, 1941, for the Gas Department. The Town Clerk, Council House, Smethwick.

Wallasey, May 20—Castings, phosphor bronze, iron and gunmetal, also firebars for three or 12 months from July 1, for the Town Council. Mr. E. Evans, town clerk, Town Hall, Wallasey.

Wellington, N.Z., May 29—Three tons of copper binding wire, 60 lbs. per mile, and two tons of copper binding wire, 50 lbs. per mile, for the New Zealand Post and Telegraph Department. (D.O.T. reference: T. 18697/40.)

Birkenhead, May 17—Vertical-type compound condensing slow-speed steam engine, reciprocating force pump, and horizontal-type slow-speed oil engine, for the West Cheshire Water Board. Mr. C. Hardman, engineer, Water Board Buildings, 11-15, Cross Street, Birkenhead.

Calcutta, June 27—Boilers for engines, for the Indian State Railways (Eastern Bengal Railway). (D.O.T. reference: T. 18502/40.)

Cape Province, May 29—Four electrically-driven centrifugal low-lift pumps, each capable of delivering 12,500 galls. per hr., and one vertical-spindle sludge pump, 40 galls. per min., for the Municipality of Upington, Cape Province. (D.O.T. reference: T. 18756/40.)

New Zealand, June 25—11,000-volt outdoor-type oil-immersed circuit breaker, for New Zealand Public Works Department. (D.O.T. reference: T.Y. 18700/40.)

Tullamore, May 21—Electrically-operated pumping machinery, for the Offaly County Board of Health. Mr. Nicholas O'Dwyer, consulting engineer, 6, Burlington Road, Dublin. (Fee £2 2s., returnable.)

Wellington, N.Z., May 27—Six 5-k.v.a. 230-v. 50-cycle single-phase Diesel-engine driven generators, for the New Zealand Post and Telegraph Department. (D.O.T. reference: T. 18693/40.)

Wellington, N.Z., May 28—Textile-covered, lead-sheathed telephone cable, for the New Zealand Post and Telegraph Department. (D.O.T. reference: T. 18695/40.)

New Companies

(From the Register compiled by Jordan & Sons, Limited, Company Registration Agents, 116 to 118, Chancery Lane, London, W.C.2.)

Erskine Tool Company, Limited—Capital £1,000. Director: R. A. Wilson, 28, Monks Avenue, New Barnet.

Western Foundry Supplies, Limited, 7, St. Stephen Street, Bristol, 1—Capital £2,000. Directors: S. G. Ward, J. F. Gist and F. Jackson.

F. E. Shove & Company, Limited—Capital £1,000. Iron, brass and general metal founders, etc. Directors: F. E. Shove, Sunnygarth, The Park, Great Bookham, Surrey; and C. Paxman.

F. T. Seagrim & Company, Limited—Capital £5,000. Hirers, manufacturers and factors of plant, machinery, implements and tools, etc. Directors: E. F. Crosthwaite, The Black Prince Hotel, Princes Risborough, Bucks; and H. H. Wadeson.

Fellowe Engineering Company, Limited, 81, Highgate Road, Sparkbrook, Birmingham, 11—Capital £500. Manufacturers and factors of machined metal articles and components, metal pressings, etc. Directors: R. N. Fitt, F. Edgington, H. Lawrence and E. F. Lowe.

New American Foundry

A new foundry at Indianopolis built by the International Harvester Company to produce all the castings used in its trucks has four Whiting cupolas with an hourly capacity of 20 tons each, states "The Iron Age." These are tapped continuously into 5-ton reservoir ladles. The floor area of the foundry is 215,795 sq. ft., whilst the total length of the conveyors is 16,583 ft. The capacity of the sand storage hoppers is given as 22,820 tons.

Forthcoming Event

MAY 17.

Institution of Mechanical Engineers:—Exhibition of industrial cinematograph films, at the Institution, Storey's Gate, London, S.W.1, at 6.30 p.m.

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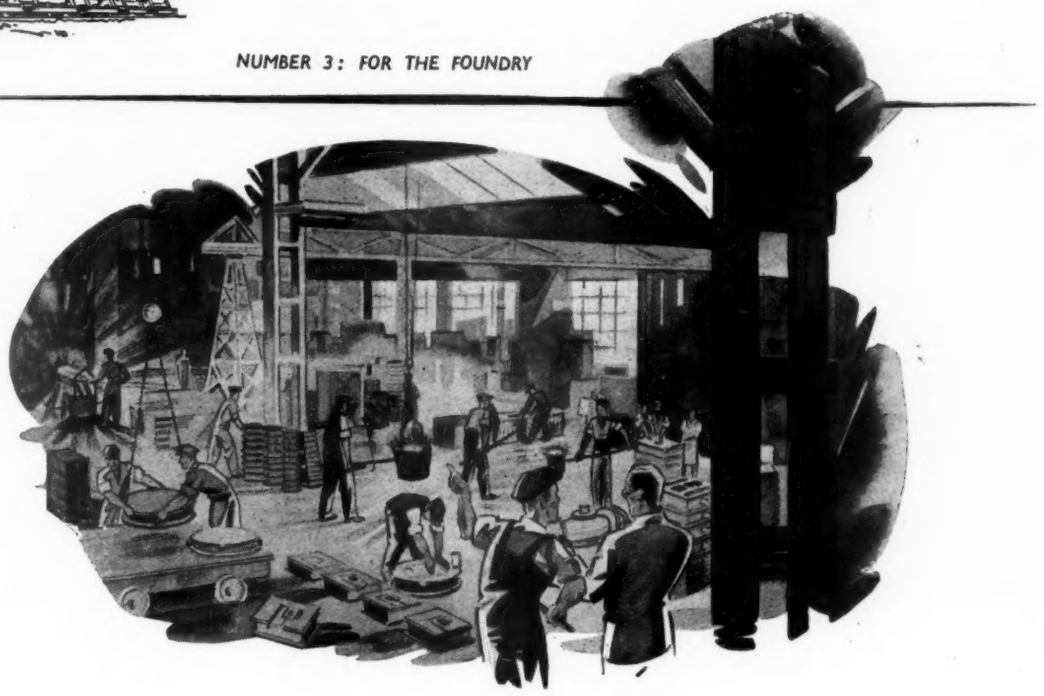

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Raw Material Markets

An increase in the present maximum prices for iron and steel would come as no surprise to the industry in view of the steadily rising costs of production. As announced below, scrap prices have been increased to meet the higher railway charges, but the 10 per cent. addition to rail freights affects all sections of the industry alike. There is little change to report in trade conditions, most of the output of the steelworks being sold ahead on Government account. Supplies of scrap from home sources appear to be more plentiful, while Belgian steel semis are arriving satisfactorily.

Pig-Iron

MIDDLESBROUGH—The requirements of local users of Midlands foundry iron are being well met, and it cannot be said that, apart from the additional transport charges, much inconvenience is caused by the suspension of Cleveland iron production. The higher rail rates will, of course, add appreciably to costs, and makers will press this point when selling prices are again under revision. East Coast hematite is in strong demand, with output barely sufficient to cope with current orders. Stocks are mostly low, and it is hoped that production will be expanded shortly.

LANCASHIRE—There is moderate activity among the light-castings foundries of this area, and order-books are unsatisfactorily placed. Jobbing foundries, on the whole, are fairly well situated, although some concerns could accept much more work. Speciality engineers are briskly employed, Government contracts accounting for a large proportion of their outputs. West Coast hematite is in steady demand.

MIDLANDS—There is not much change to report in the state of the light-castings industry in this area; as in other parts of the United Kingdom, the trade is severely affected by the decline in building specifications, while the loss of much of the export business is also difficult to overcome. There is, as yet, little in the way of Government work available for this trade and, unless this is forthcoming, the only hope of an improvement appears to be in a revision of the Government's present policy with regard to the building industry. Other engineering concerns in the Midlands are active, and the demand for low-phosphorus iron and hematite is strong. Supplies of both descriptions are now arriving at consumers' works more freely, and the position is expected to show steady improvement. Stocks of high-phosphorus iron are not very substantial, despite the poor demands of the light foundries, as production is restricted, owing to many furnaces formerly engaged on the production of this iron having latterly been transferred to basic iron production. Basic is, of course, in heavy request at the steel plants.

SCOTLAND—There has been some improvement in the position of the Falkirk light-castings industry following negotiations between a representative of the Ministry of Supply and the foundries, but the absence of housebuilding specifications and the loss of much of the export trade formerly carried on by the light engineering concerns are still preventing a return to anything approaching normal conditions. Foundries will thus be keen to support a joint memorandum on the effect of the war on the building industry and building programmes in Scotland which has been submitted to the Secretary of State for Scotland by various bodies connected with the building trade. Heavy engineers in Scotland are extremely busy. Hematite and basic iron are being taken up in large tonnages by the steelworks.

Coke

The increased rail charges make it practically certain that the price of foundry coke will be raised in the near future. Contracts for Durham best coke have for some time past been made subject to a rise-and-fall clause, and consumers will have to pay any increase immediately. Consumption is maintained at a very good level for the time of the year, while the demand is enhanced by the desire to accumulate reserve stocks. Deliveries are very satisfactory.

Steel

All descriptions of finished and semi-finished steel products are in exceptional demand, and the producing works are operating to capacity. Production of steel is being greatly facilitated by imports of Belgian semis, which are very much higher as compared with the corresponding period of last year, while better deliveries of home-produced scrap are also reported. At the end of this month all deliveries from steelworks and rerollers will be controlled under the new scheme for distribution, and there should then be a considerable improvement in the quantity of steel available for Government contracts, while genuine inquiries from other sources will be assured of sympathetic consideration.

Scrap

The Minister of Supply has made the Control of Iron and Steel (No. 7) (Scrap) Order, 1940, Direction (No. 3), increasing the maximum prices for scrap iron and steel as from May 6, to meet the recent increase of 10 per cent. in railway charges. In the case of scrap iron and steel for the manufacture of steel ingots, otherwise than in electric arc furnaces, the maximum prices have been increased by 1s. 6d. per ton for consumers in South Wales (West); by 1s. per ton for consumers on the North-West Coast and in Cheshire (including Shotton), Brymbo and South Wales (East); by 6d. per ton for consumers in the Midlands (except for two grades of cast iron which are increased by 1s. per ton); and by 9d. per ton for consumers in all other districts. All other grades of scrap are also increased by 9d. per ton.

The higher prices for scrap announced are not likely to affect the flow of materials, as the increase has been made solely to cover the new rail charges, which are an important matter for the iron and steel trade. Supplies are coming through to the consuming works rather more freely, but the demand still outstrips available tonnages from home sources, and imports on a heavy scale continue to be necessary.

Metals

The total visible supply of tin on April 30 amounted to 23,119 tons, compared with 22,980 tons at the end of the previous month, according to figures compiled by Mr. W. H. Gartsen (Henry Rogers, Sons & Company). The carry-over in the Straits Settlements at 4,564 tons was 667 tons lower on the month, while the carry-over at principal European smelters at 3,616 tons was 1,160 tons down. Thus the decline in stocks in April was 354 tons.

The London tin market has been quite firm. Fairly substantial American buying is reported, most of it being apparently for current needs. Italian interest in tin remains keen.

The International Tin Committee meets in London on May 27 to consider the quota for the third quarter. In view of recent reductions in stocks and the consequent increase in the price of the metal, it is unlikely that the quota will be reduced below the present level of 80 per cent. If any change is made it seems certain that a higher quota will be introduced.

Following the recent assertion of Mr. Ronald Cross, the Minister of Economic Warfare, in his speech to the American Chamber of Commerce, that Germany is obtaining supplies from the United States *via* Siberia, official quarters in Washington have made it clear that American exports of tin and rubber to Russia have ceased, while copper shipments have greatly diminished.

Metal Exchange prices for tin this week have been as follow:—

Cash—Thursday, £254 10s. to £255; Friday, £254 to £254 5s.; Monday, £253 15s. to £254; Tuesday, £255 to £255 10s.; Wednesday, £255 to £255 5s.

Three Months—Thursday, £251 15s. to £252; Friday, £251 15s. to £252; Monday, £251 15s. to £252; Tuesday, £252 15s. to £253; Wednesday, £252 15s. to £253.

Consumption of copper in the United Kingdom is on a heavy scale in connection with munitions and other Government contracts, and only a comparatively small quantity is allocated to other consumers. American domestic demand is quiet, and it is probable that the quotation will be lowered. Spelter is being taken up in good tonnages. The approaching completion of contracts for Anderson shelters has relieved the demand for zinc to some extent, but, generally speaking, the galvanisers have good outlets for their products. While armaments account for the consumption of quite a large amount of lead, the absence of building contracts has released a substantial tonnage for other purposes.

Patent Specifications Accepted

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each. The numbers given are those under which the Specifications will be printed and abridged, and all subsequent proceedings will be taken.

519,027. STEWARTS AND LLOYDS, LIMITED, and BLAIR, J. S. Branched pipes.

519,091. HENLEY'S TELEGRAPH WORKS COMPANY, LIMITED, MOLLER, P. D., and BREEZE, H. W. Cast metal pipe joints.

519,156. PALMER, A. S. Cleaning, descaling, and coating compound for ferrous metals, for use during hardening or tempering processes.

519,374 SCHNEIDER, J. F. Welded rail bonds.

519,409 SOC. DES ACIERIES & FORGES DE FIRMINY. Hot-rolling of steel.

519,537 DEUTSCHE ROHRENWERKE AKT.-GES. Method of and apparatus for facilitating the separation of imperfectly welded tubes from properly welded tubes.

519,550 ARMSTRONG, J. J. V. (American Rolling Mill Company). Manufacture of metal tube.

519,572 INLAND STEEL COMPANY. Steel.

519,597 SIEMENS & HALSKE AKT.-GES. Permanent-magnet alloys.

519,554 SPLADIS SOC. POUR L'APPLICATION D'INVENTIONS SCIENTIFIQUES. Centrifugal electric furnace plant.

519,604 WILLIAMS, W. P. (American Rolling Mill Company). Processes and devices for reducing sheet metal.

519,615 INLAND STEEL COMPANY. Ferrous alloys.

Applications for Trade Marks

The following list of applications to register trade marks has been taken from the "Trade Marks Journal":—

"DANSDRUM."—Steam boilers. DANIEL ADAMSON & COMPANY, LIMITED, Dukinfield, Ches.

"LEDLOY."—Steel containing lead. LEDLOY, LIMITED, 66, Cannon Street, London, E.C.4.

"NCH"—Excavating machines parts. NEWTON, CHAMBERS & COMPANY, LIMITED, Thorncliffe Iron Works, Sheffield.

"THYRECT"—Mercury vapour rectifiers. BRITISH THOMSON-HOUSTON COMPANY, LIMITED, Crown House, Aldwych, London, W.C.2.

"ZERO-LASH."—Valve gear. EATON MANUFACTURING COMPANY, c/o Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

"DI-MATIC."—Screw machines. BILLINGS & SPENCER COMPANY, c/o Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

"XAM-OM."—Hand tools and instruments. CLEVELAND TWIST DRILL COMPANY, c/o Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

"KAMEWA."—Propellers and steering gear for ships. AKTIEBOLAGET KARLSTADS MEKANISKA WERKSTAD, c/o McKenna & Company, 31-34, Basinghall Street, London E.C.2.

"PIGEPLAS," "PIGELAN" and "TELEPLAS"—Insulated electric conductors or cables, and electrical insulating materials. PIRELLI-GENERAL CABLE WORKS, LIMITED, 343/5, Euston Road, London, N.W.1.

Application to the Cutlers' Company, Sheffield

"HAYDEN-NILOS."—Metal machine belt fasteners and hooks and machines for inserting them. J. E. HAYDEN, LIMITED, Supersis Works, Mitchell Street, Sheffield, 3.